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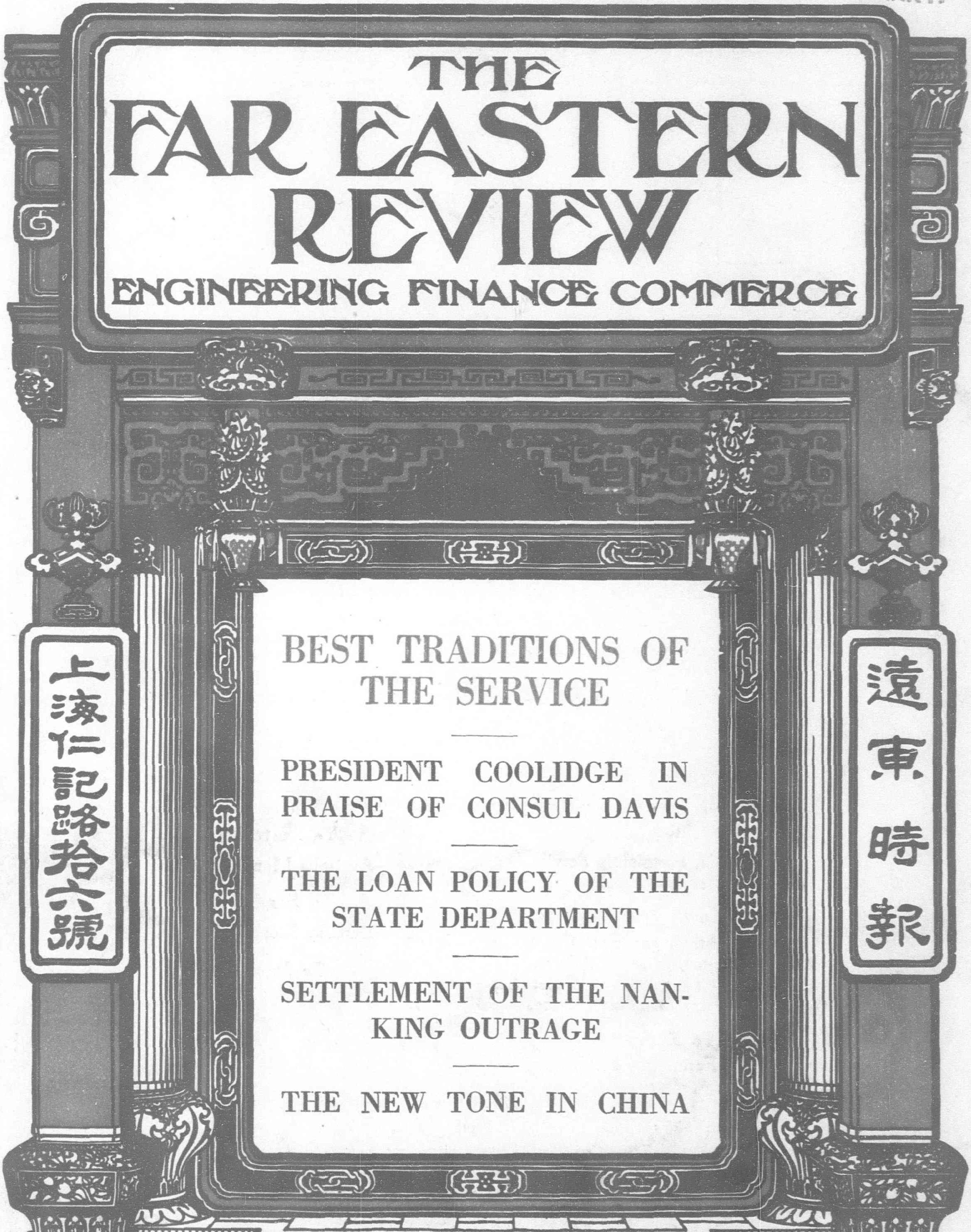


THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

遠東時報

上海仁記路拾六號

BEST TRADITIONS OF THE SERVICE

PRESIDENT COOLIDGE IN PRAISE OF CONSUL DAVIS

THE LOAN POLICY OF THE STATE DEPARTMENT

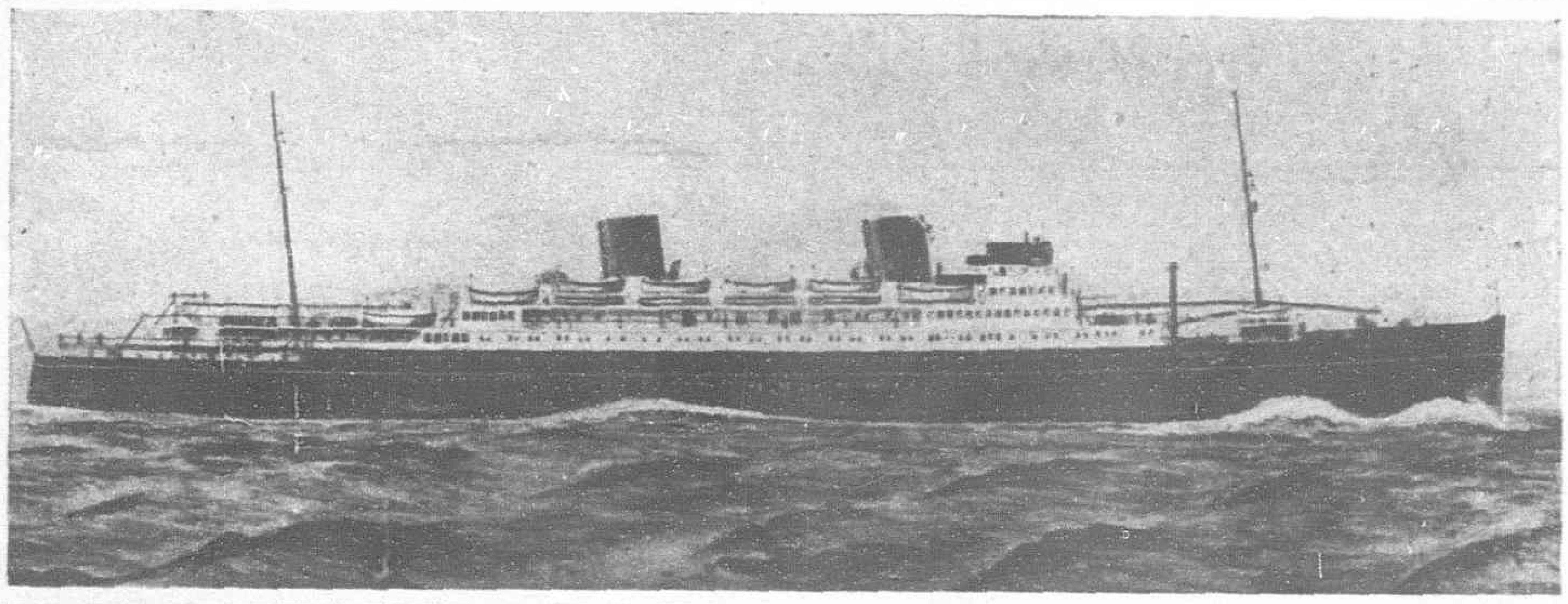
SETTLEMENT OF THE NANKING OUTRAGE

THE NEW TONE IN CHINA

Vol. XXIV March, 1928 No. 3

SHANGHAI, PEKING, TOKYO AND MANILA

New Era Dawning
in
Trans-Pacific Travel



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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

VOL. XXIV SHANGHAI, MARCH, 1928 No. 3

The Best Traditions of the Service

NOTHING reflects the policy of the present Administration towards the protection of American lives and properties abroad better than the citation for bravery accorded Commander Roy C. Smith of the Destroyer Noa for his prompt action which prevented a massacre of foreigners at Nanking. That the American Government does not consider that event as a "minor incident" is again attested by the promotion of Consul John K. Davis and his assistant at Nanking, Vice-Consul J. Hall Paxton. As the list of promotions in the Foreign Service go to the Senate for confirmation, we find that once more the American Government recognizes the debt of all American citizens to the officials whose courage and initiative saved the day at Nanking.

In the crisis when only the guns of the destroyers stood between the American colony and death and dishonor, Mr. Davis marshalled his nationals around the consulate, then led them to a natural defensive position on Socony Hill, and directed the signals to the naval craft in the river and supervised the embarcation of his flock to safety. Subsequently, a group of so-called Americans sought to minimize the heroism of Mr. Davis and heaped upon him tons of words of propagandistic opprobrium, in the hope of thus damaging the reputation of a fine servant of the American Government and people. This is not the first occasion on which Mr. Davis showed his capacity : he, together with the late Roy Anderson and a Chinese official. Mr. Wen Shih-tsen rescued the captives held by bandits at Lincheng and among them was the American journalist who then most vigorously demanded intervention but who now opposes even the protection of American lives.

Mr. Davis is now serving as First Secretary of the legation at Peking being promoted one grade in recognition of his distinguished conduct at Nanking. His promotion is accompanied by a personal letter of commendation from the President of the United States which reads :—

" *My Dear Mr. Davis,*

" *I have received from the Department of State their recommendation that you be granted a special promotion from Class IV to Class III of the Foreign Service in recognition of your distinguished service at Nanking in March, 1927. It has given me great pleasure to send this nomination to the Senate*

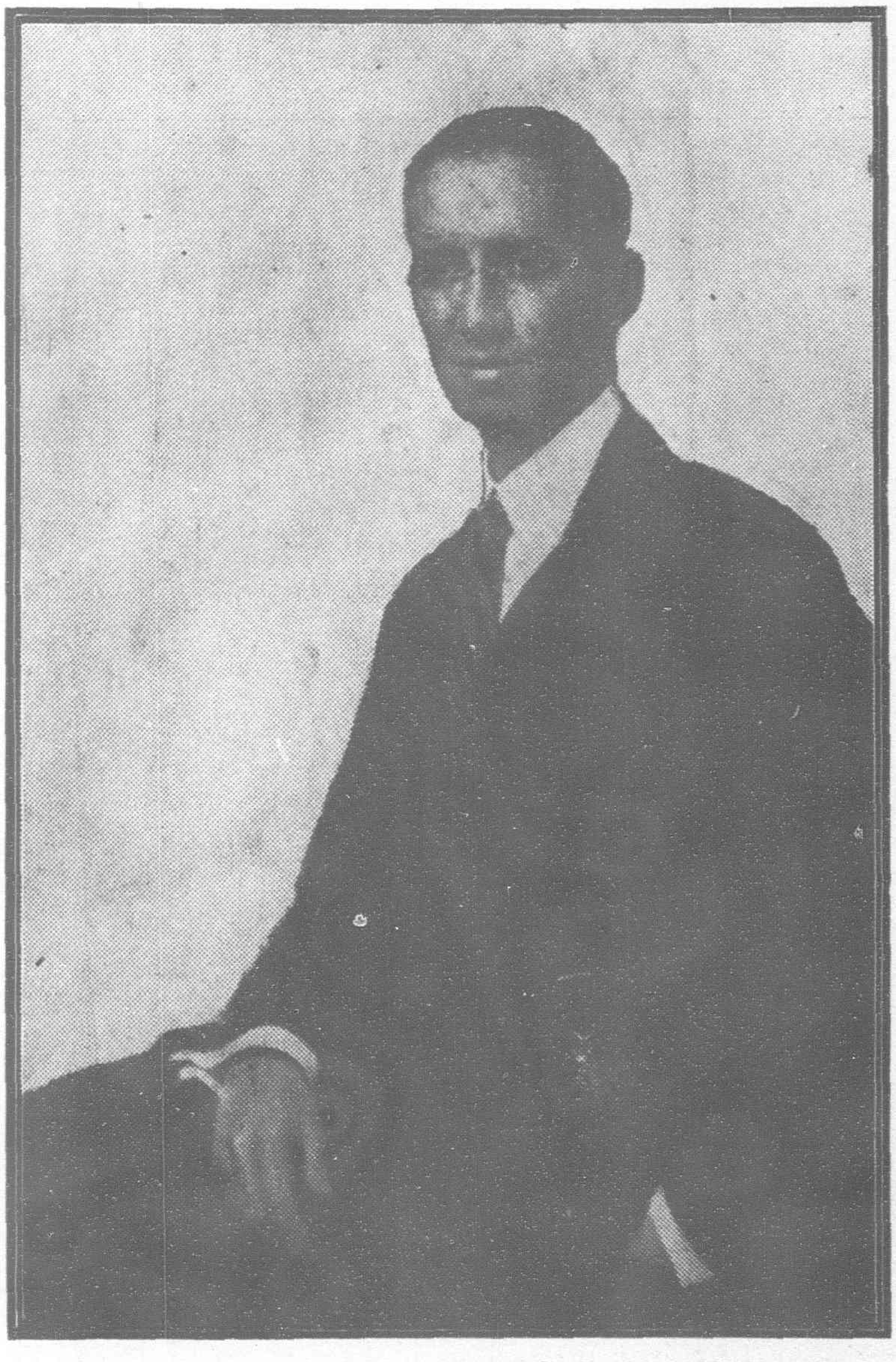
" *The work of the Foreign Service is at times difficult and on occasion hazardous, but, as the long record of the service shows, its officers throughout the world have often given proof of splendid devotion to duty, disregard of danger and the ability to meet emergencies and to discharge creditably every responsibility placed upon them.*

" *Your conduct at Nanking was in keeping with the best traditions of the service. The department has already commended you for your loyal and efficient performance of duty at your post, but I wish to add my own commendation of your zeal and courage which have set an example to your colleagues and in large degree enhanced the prestige of the foreign service.*

" *Very sincerely yours,*

" *CALVIN COOLIDGE.*"

Every honorable American in China will applaud this just recognition of merit. Coming as it does after a deliberate campaign on the part of Sovietized citizens to minimize the importance of the Nanking incident and to twist the attitude of the State Department into an endorsement of their policies, it stands as an indictment of their activities. The letter of the President of the United States to Consul Davis carries the message to all Americans in China that as long as the present Administration is in power, their lives and properties will be safeguarded as far as it is within the power of our armed forces.



By Courtesy of The China Press

Consul John K. Davis

Shanghai Welcomes MacMurray

Mr. C. H. French Delivers Brilliant Address

THE entire American Community gathered at a dinner given in honor of Mr. John Van Antwerp MacMurray, American Minister to Peking, at the American Club in Shanghai, on the occasion of a recent visit to this city. In the course of his address of welcome, Mr. C. H. French, chairman of the American Chamber of Commerce, said:

I shall not attempt to voice to our guest of honor this evening the welcome which this large gathering betokens. It is in itself a proof of the sincere admiration and esteem in which we hold him. Furthermore, Judge Franklin has been selected to convey to him in a fitting address the inner meaning of his popular reception tonight by the American Community of Shanghai.

A few years ago Americans in China were like all Gaul—divided into three parts each speaking a different language. Officials, missionaries and businessmen seldom got together on the common grounds of citizenship and mutual understanding. To-day there is ample evidence of a growing desire on the part of each to comprehend the idiosyncrasies of the other, and to co-operate in the performance of that first duty of an American citizen: The promotion of his country's welfare.

I do not mean to infer that Americans in China have heretofore been lax in the performance of that duty. On the contrary, America has no more patriotic or loyal citizens than those whose lot has been cast abroad. But I do mean to point out the folly of our working at cross purposes, and to stress the fact that in union there is strength.

I lay particular emphasis upon this, because during the past year certain Soviet-inspired journalists have seized upon our former non-affiliation as a point of attack in their campaign of malicious and vindictive vilification of Americans in China. A traitor to his country is one who betrays it. When the high calling of journalism is prostituted by any man to traduce his fellow citizens on behalf of Communism, I hold that compared with that man, Benedict Arnold was a patriot.

The axiomatic proposition that the first duty of every American citizen is to promote his country's welfare, has for its corollary the fact that it is the duty of every American in China to promote the political, social and economic welfare of the Chinese people. It goes without saying that the welfare of a people comprising nearly one quarter of the population of the world is of vital concern to America, and particularly so from the standpoint of our own economic development.

Japan with her sixty millions of people imports each year from America merchandise to the value of $250,000,000. China, with a population nearly eight times that of Japan, now imports annually from America merchandise to the value of only $100,000,000. With the restoration of peace, it is not unreasonable to forecast that—possibly within the next generation—her imports from America may well approach the staggering volume of $2,000 millions annually. For make no mistake about this: China is at the dawn of an intensive industrial and agricultural development wihch will not only rival that of Japan but which, in view of present world facilities, will be realized in a much shorter time. Compute what that may mean to the future of America in terms of material prosperity, and then ask yourselves whether or not the people of the United States are concerned in China's welfare. If, on the other hand, you are inclined to feel that China needs America more than America needs China. I ask you to turn your eyes toward the United States and consider well the fact that even now America urgently requires a vastly larger outlet for the rapidly and ever increasing surplus products of her industries.

One of the greatest economic services which Secretary Hoover has performed for our country is the institution of the nation-wide movement for the elimination of waste in production and distribution. And we (officials, missionaries and businessmen alike) must do our part by assisting to retain and develop for America her just share of this stupendous potential market in Asia—this market which cannot fail to benefit in proportion as we ourselves benefit, since the needs of China and America are reciprocal.

Any policy formulated by the American Government which is not based upon these considerations is politically and economically unsound. But Minister MacMurray and the American Chamber of Commerce of Shanghai have been accused of undermining America's policy in China. Your Excellency—on behalf of the Chamber I wish to say that we feel both highly honored and deeply gratified at the implied felonious association. But in what sort have we been guilty of this heinous offense? Gentlemen—it is pertinent to review briefly the action taken by the American officials and by this Chamber in that evil hour when the sinister shadow of Soviet Russia fell athwart China. I say without fear of contradiction, that in the light of subsequent events and upon the evidence of authentic Soviet documents, we now know that no greater peril has threatened the Chinese people since the days of Genghis Khan.

Cruel; designing; cynical; trained in sophistry, and with an incredible lust for murder and destruction,—the Red Terror, under the guise of friendship, purposed to exterminate a helpless and distressed people. And in the initial process of such destruction, they planned through mendacious and subversive propaganda to keep the rest of the world blinded lest their hellish designs be foiled by outside intervention. So well did they succeed in their campaign of misrepresentation that even after Borodin and Co. had swept the Yangtze valley with his orgy of murder, rape,

John Van A. MacMurray, U. S. Minister to Peking arson, looting, torture and extortion, our home government and that of other nationals still professed to believe that it was merely a phase of China's factional struggle to attain unity.

Such was the insidious influence of enemy propaganda upon the press of America, that even that trained, able, and impartial observer of world affairs, Frederick Moore, representative of the New York "Times," was censured by his own paper for his insistence at that time in attempting to get the facts before the American public. The full, complete and unbiased reports of our officials failed for a time to counteract the cumulative effect of such propaganda upon the Administration at Washington. But our officials in China did more than report. Gentlemen—we have reason to be proud of the stand taken by them in that dark hour. In the face of dilatory instructions from home, and with the certainty that they would be subjected to venemous attack calculated to ruin their careers, they acted with the courage of their convictions. And if—in all that riot, and confusion, and darkness—friend was at times mistaken for foe, the essential fact remains that they and their associates did succeed in checking that monstrous Saturnalia of bolshevism sufficiently to give to the Chinese people the opportunity to extricate themselves from the doom which portended.

Thus, Gentlemen, has America's policy in China been undermined by Minister McMurray. As to the Chamber, we are heart and soul with him in the policy which he has followed,—a policy designed to maintain the honor and dignity of the United States of America. The Shanghai American Chamber of Commerce has for its purpose the promotion and development of the foreign trade of the United States with China. To this end it seeks to create mutual understanding and goodwill between Chinese and Americans, and is pledged to do its utmost to remedy conditions inimical to the welfare and prosperity of the Chinese people. Such being our purpose and policy, we shall continue, in so far as lies within our power, to combat whatever may be subversive thereto.

American-Japanese Co-operation in China

A Remarkable Development

DESPITE prolonged civil war, illegal taxation, governmental chaos, disruption of transportation, brigandage, piracy and all other handicaps to business, the trade of China steadily increases from year to year. Foreign firms in China, however, do not seem to profit from this development. In fact, many of them have failed and departed from the country. Newspapers in China, commenting on this situation, conclude that the trade returns furnish evidence that if foreign firms are not getting the business, it is passing more and more into the hands of the Chinese. The facts do not support this theory, as to date, only two Chinese trading firms have seriously entered the import and export field and established offices in New York in direct contact with American producers and manufacturers. There must be some other explanation, as far as Americans are concerned, to account for the trade phenomena that is steadily increasing their percentage of the total foreign trade of the country.

In the November, 1927, number of THE FAR EASTERN REVIEW, we reprinted a speech delivered before the Rotary Club of New York by Mr. M. Uchiyama, Japanese Consul-General in that city. In the course of his address, he said: "*It is fair to state that from 30 to 40 per cent. of American exports to China are purchased in this country by Japanese firms for the account of Japanese enterprises in China.*" This remarkable statement was corroborated in part by the manager of one of the largest Japanese banks in New York who said that the annual volume of business through his bank for the account of Japanese merchants in New York exporting American goods to China, is from thirty to forty million dollars. There are seven Japanese banks in New York; the Yokohama Specie Bank, the Mitsui, Mitsubishi, Sumitomo, Taiwan, Chosen and the Fujimoto Bill Broker's Bank, in addition to an agency of the Bank of Japan. The banks of the three big trading companies (Mitsui, Mitsubishi and Sumitomo) must do a fair share of the business of their own firms, which would materially increase the amount mentioned above.

The total American exports to China for 1925 were valued at $120,000,000, of which, about 60 per cent. came under the head of Petroleum and Tobacco. The trade in these two staples is monopolized by American firms. Deducting the two main staples, it leaves about $48,000,000 of general exports, so if the Japanese statements are only approximately correct, it means that American firms participated at the most in $18,000,000 worth of general export business. The figures for 1926 are somewhat different, as, out of our total exports of $140,000,000 only 50 per cent. represented oil and tobacco, leaving $70,000,000 of general exports. The statement of the Japanese consul general would indicate that at least sixty per cent of our general exports to China are purchased by Japanese firms in New York, destined in the main, for their own enterprises in that country.

There have been several estimates of the amount of Japanese investments in China. Last June, Mr. Honda, of the Foreign Office, gave out that the total was Yen 2,600,000,000, actual money invested. The report of the Sino-Japanese Business Association for 1926 gives the total as Yen 2,500,000,000 classified as follows;

Manchuria	
Industrial and Commercial Enterprises	Yen 612,863,000
Loans and Advances	562,557,000
Other Properties	146,634,000
Other Parts of China	
Textile Industries	232,850,000
Shipping	56,000,000
Manufacturing Industries	107,600,000
Real Estate	87,800,000
Miscellaneous	25,000,000
Government Loans	700,000,000

This classification shows that industrial and commercial enterprises in Manchuria, with the textile, shipping and manufacturing investments in other parts of China totals Yen 1,009,313,000. In other words, the Japanese control a market of their own in China for machinery, supplies, accessories and raw materials valued at $500,000,000. Assuming ten per cent. for repairs, spare parts, new machinery, replacements, supplies, etc., it creates a market of about $50,000,000 a year.

Analysis of China's principal imports from the United States for 1926 will help us to arrive at a better understanding of Japan's position in the Chinese market. Japan owns outright 40 per cent. and controls through loans and advances a total of over 50 per cent. of China's total spindlage and is therefore in a position to furnish at least one half the raw cotton consumed, with some participation in the supply to Chinese mills. If Japanese firms handle only 60 per cent. of the imports of American cotton, the total would approximate $7,000,000. The same proportion would also apply to dyes, or about $1,800,000. The Japanese are also large importers of American wheat, flour and food stuffs, to the extent at least of one third of the total or, $3,750,000. They also participate in the lumber trade. Without probing further into the statistics, we have here a market under Japanese control exceeding $62,000,000. If the Japanese merchants in New York are purchasing 30 to 40 per cent. of the total American exports to China, equivalent to 42 to 56 million dollars in value, the above rough analysis, will go far towards corroborating that statement and explaining how it is possible.

The prosperity of Manchuria has contributed in large part to the steady increase of China's trade. In this field the Japanese predominate. As the markets of this territory are developed by new railways and the creation of new industrial enterprises and its agriculture expands under the impetus of rapid colonization, the percentage of American imports into China through Japanese firms will tend to increase rather than diminish.

The Japanese Consul-General at New York stated a fact.

Americans interested in China are confronting a situation that must be recognized. The great Japanese trading firms have their own officers in New York and other American export centers, where they purchase in large quantities for their own home market. They are in a position to obtain the most favorable terms from the American manufacturer and to take advantage of market conditions. They have their own banks; their own steamship lines, insurance companies and many other aids to commerce. As long as Japanese investments in China stand at the above figure, as long as they control and direct the development of Manchuria, nothing that any one else may do, can alter the basic situation. It is their market, created by their own iniative and capital. Until such time as the Chinese settle down and seriously undertake the development of their own resources and transportation that will give to American firms in China an opportunity of increasing their proportion of the nation's trade, the above figures must be accepted as evidence that the Japanese market in China for our general export lines is a reality. As the transportation facilities of Manchuria are extended, this Japanese controlled market will increase, not by reason of any political domination, aggression or dimunition of Chinese sovereignty, but through the inexorable laws of trade that places the country which purchases the bulk of the products of another country in the most favorable position to furnish its imports. Whether the railways to be built in Manchuria are Chinese or Japanese, they will develop the country, increase its exports and create a greater demand for foreign goods. Whoever takes the bulk of the exports will get the cream of the exports. The Chinese may question the validity of Japan's position, but when it comes to the disposal of their Manchurian produce, they will sell gladly to the one nation which has the greatest need for them and already controls the market.

Judge Gary was right. American commercial relations with China have become linked with those of Japan in the same way that some of our major exports to China have come under the control of British companies, as, for instance, tobacco. As we cannot change these conditions except by huge investments of American capital in a country which as yet offers no guarantee for its security, all matters affecting the rights and interests of China, Japan and the United States should receive the most careful study on the part of our statesmen and business men.

We cannot play the ostrich and escape the facts by calling them Japanese propaganda. Either they are true, or they are false. If they are true, it serves no good purpose at this time to denounce the Japanese for having carried their ideas of co-operation with America to the point where their enterprises in China now constitute our second best market in that country. Through the folly of a group of propagandists who instigated the protests against the proposed loan to the South Manchuria Railway, a legitimate and almost exclusive market for high grade American engineering products has been placed in jeopardy.—G. B. R.

The Settlement of the Nanking Outrage

MR. HUANG FU, Minister of Foreign Affairs of the Nationalist Government has since his appointment been devoting himself to the settlement of the Nanking Outrage, that is, towards satisfying the United States, Great Britain, Japan, France and Italy for the damages done to the lives and property of their nationals by the Communists who occupied Nanking on March 23, 1927. The settlement must involve 1, an apology; 2, reparations; 3 punishment. Mr. Huang Fu has issued a statement in the form of an order of the Nationalist Government, concerning punishment and there can be no question of the apology, for the Nationalist Government is quite prepared to apologize for the conduct of their Communistic troops on this occasion, now that they have driven the Russians out of China and they have themselves become anti-Communist. But they are not ready or they are unable to make adequate financial amends for the loss of life and property. The negotiations have therefore not yet reached a conclusion.

But the question of punishment is also not being handled in a proper manner. Mr. Huang Fu's statement may be quoted to indicate the intentions of his Government:

> The Government Council issued two important mandates yesterday, one ordering the arrest of the principal culprits responsibile for the Nanking Incident last year and the other decreeing protection to foreign nationals in China. A textual translation of the mandates follows:
>
> "During the capture of Nanking in the third month of last year, when the Nationalist Army was busily engaged in exterminating remnants of the enemy in the midst of disorder and confusion, a part of the Army together with the local riff-raff, at the instigation of Communists, daringly plundered the friendly foreign Consulates in Nanking and the residences of foreign nationals in and outside the city, to the extent even of killing and injuring Consular officials and other foreign nations. This, indeed, is very regrettable. Presently when high military commanders were informed of the incidents, separate detachments of troops were immediately dispatched to the scene to suppress further disorders. Besides putting to death on the spot the responsible soldiers, Hsu Chan-sheng, Chang Fa-kua, Wang Chen-fa, Ma Ho-sen, Hwang Chi-chang and 14 others, and the responsible local desperadoes, Yang Shen-sen, Chao Chi-yen, Chang Fa-lin, Chen Ming-sao and 28 others, the Government on the 12th of the fifth month of last year issued an order for the arrest of Lin Chu-han, Director of the Political Department of the Army, who was the principal propagator of the Incident, but whose arrest has not yet been effected.
>
> "It is hereby ordered, that all the military and civil authorities shall instruct their subordinates to apprehend and arrest this and other responsible culprits for prosecution and punishment according to law in order to suppress disorder at the root."

The selection of some fifty odd coolies and soldiers, whose names mean nothing, whose personalities stand for nothing and to throw upon them the full blame for the Nanking outrage is an insult to the intelligence of the Chinese people as well as the foreign Powers. Two men were responsible for the Nanking Outrage; General Chen Chien, commander of the 6th Army, which occupied the city and Mr. Lin Tze-hon, head of the Political Department of the Army. General Chen Chien is one of the principal men in the provinces of Hupeh and Hunan and the Nanking Government dares not hold him responsible because that would mean war between Nanking and Hankow. Mr. Lin is in Moscow and the Nanking Government cannot punish him. It cannot be verified whether the fifty old coolies were punished for the events in Nanking or not; it cannot even be proved that they ever existed. The Nationalist Government therefore in the above statement evades the question of punishment politely but none the less definitely and it asks great Powers, who have admittedly suffered a great wrong, to abide by this deception.

The Nanking Government would gain much more by frankness. General Chen Chien would rise in political stature by frankness. They have already admitted that the Communists have done the deed, but they should also be ready to assume responsibility and plead guilty to the charge of carelessness and of permitting the lives and properties of foreigners in their territory to be destroyed by the Communists. Any suggestion of going out into the graveyards and culling fifty odd names and attempting to hold these names responsible for a great wrong is not manly; is it not politics; it does not help to restore friendship between China and the Powers.

The New Tone in China

By George E. Sokolsky

IT was inevitable that when the Nationalists threw over their Russian allies, they would turn to the so-called imperialist nations for friendship. For the Russian campaign of hatred against Great Britain, the United States and Japan in China was un-Chinese and therefore could not continue without constant augmentation and support from Russia. The Nationalist Government in its present antagonism to Soviet Russia makes no secret of Russia's complicity in the Communist efforts in China during the past three or four years. In their eagerness to prove how evil the Russians have been the Nationalist Government has perhaps gone to excesses. Their treatment of five Russians, four men and a woman, who fell into their hands at the moment of the breach of relations, has been most unfortunate, for these five human beings have been imprisoned for almost half a year without due process of law or a fair trial.* The efforts to close down Russian commercial firms was an error of judgment, because the trade between the two countries should be allowed to continue. But these unjust incidents are only proof of the complete swing of the pendulum. The reason that the five Russians cannot get a fair trial is that no judge is willing to be tainted with the pro-Russian tar brush at this time and few officials are willing to show by their support of these unfortunate people that they still have connections with the Russians. It is a complete reversal of attitude.

General Li Chi-sen

In the South, the changed viewpoint has been particularly effective in bringing about an entente between Canton and Hongkong, which have been fighting each other since 1925. Now, there is such cordiality that when the Governor of Hongkong visited Canton, the Chinese commander, General Li Chi-sen, is reported to have threatened to fine any person who failed to fly the British flag. British trade in the South is rapidly improving and there is a real estate boom in Hongkong. When Sir Miles Lampson, the British minister, visited the ports of South China, he was everywhere received with the greatest cordiality and deference.

So far as Japan is concerned, there has been no anti-Japanese agitation anywhere in China during recent months and Japanese business is advancing satisfactorily. The Japanese have numerous outstanding problems which will have to be settled before Japan can afford to take chances with the new regimé, but the spirit on both sides is a healthy one and there is no likelihood of the slightest trouble between the Chinese and the Japanese in the near future.

The United States is not involved so heavily as either Great Britain or Japan in the numerous problems between China and the foreign Powers, because American interests in China are slighter. The principal American interest is missionary activity and although the schools, churches and hospitals have not *all* been returned, there is a marked change of attitude both on the part of the people and of the officials throughout the interior. The missionaries have unfortunately themselves complicated their own problems by hasty action during the Communist control of Nationalist China and there is little the American officials can do to help them away from their own misunderstanding of events. There major error was to misread Chinese affairs, to believe that all the opposition to Christianity was genuine, to support with a world-wide propaganda the activities of the Communists—and now they find that those who are opposed to Communism, the Kuomintang and the Nationalist Government are not as concerned with helping them to solve their problems as they are to get trade and business moving.

The American Minister in China, Mr. MacMurray, is visiting the Yangtze Valley and is obtaining a first hand view of the situation there and it is more than probable that if any man can help the missionaries to get back their schools and hospitals and churches, he will do it. Many of the Chinese Christians who have been educated in the United States have failed to realize their opportunities, but General Chang Tze-kiang, an adherent of Marshal Feng Yu-hsiang, has bravely come forward and demanded that the Nationalist Government shall recognize religious liberty. His demand will not fall on deaf ears and once religious liberty is fully recognized and protected by the Nationalist Government, the Christian missions will benefit therefrom and will be permitted fully to continue their work for the general good of the Chinese people.

Trade and commerce will not be made to suffer the propagandistic handicaps foisted upon China by the Communists. There are no boycotts, no anti-foreign slogans, no inspired mass animosity. The Ministers of Finance and of Commerce and Industry of the Nationalist Government, Mr. T. V. Soong and Dr. H. H. Kung may be expected to encourage foreign trade. Almost as soon as Mr. Soong became Minister of Finance, he entered into tax arrangements with the British-American Tobacco Company and the Standard Oil Company which have been beneficial to the Government and to the companies and which will result in a stabilization of trade throughout Nationalist territory if these agreements continue to function over a reasonable period of time. The Tariff question, over which there has been so much agitation in China, continues to remain unsettled, but there is really no reason why there should be a settlement when the Nationalist Government and the Peking Government both believe that they are on the verge of that signal victory which will bring to their country peace and unity. That can be delayed a few months, until victory is achieved or until it is certain that a stalemate will continue.

Although from the standpoint of the foreigner, particularly the British, the Japanese and the Americans, conditions in China have improved by leaps and bounds during the past few months, internal political affairs are still chaotic. North and South insist upon continuing their warfare and armies of more than a million men are now moving against each other, each army believing that it must be victorious and the general public remaining of the opinion that there will be no decisive victory this year. The provinces continue to enjoy a very large measure of autonomy, larger in fact than during the communist control of the Nationalist Government. Taxes are being frittered away in warfare and politics, but no one has yet been able to suggest a more feasible method of determining who shall rule China than by the movement of vast armies across the country. There is, however, this saving fact, namely, that wars are becoming more real and costly, that there is a financial shortage on all sides and that the soldiers of both the North and

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* As this issue goes to press, they are being tried in Nanking.

South have benefited from the Communist propaganda to this extent, that they think politically and are not likely to follow any leader whose activities are definitely harmful to the Chinese people.

The anti-Russian movement has unfortunately led to what some call the White Terror, namely, to a reactionary tendency in the Kuomintang, which has become intolerant of criticism and which has engaged itself to suppress all popular demonstrations of dissent. These excesses are perhaps not unnatural when political leaders change their faith. But it is important for the welfare of China that the Kuomintang and the Nationalist Government should remain progressive, that reaction should be tabooed lest the masses of the people turn again to the Communists for solace from their disappointments. There is still danger that the Communists will have another opportunity to test their theories in China and every reactionary measure adopted in Nanking brings that possibility more within the realm of probability. But the people of the South and of the Yangtze valley have experienced the horrors of the Red Terror and if the White Terror is not too awful, the Communists will not have much of a chance.

The Loan Policy of the Department of State*

By *Arthur N. Young, Economic Adviser of the Department of State*

COUNTRIES are either borrowers or lenders. Hardly any country in these times heeds the poet's injunction, " Neither a borrower nor a lender be." Some countries, like England and Holland, have long been in the lending class. Others, including most of the Latin American States, have long been borrowers. The United States, prior to the war, was a borrower of European capital. Hundreds of millions of dollars of American securities were sold and owned in Europe. Although for many years the volume of capital in the United States had been growing, war conditions accentuated the transition from borrower to lender. In recent years, the United States has loaned capital abroad at a rate greater than that of all other countries combined prior to 1914. More than $1,500,000,000 of Latin American securities have been sold in the United States since 1919. This is 23 per cent. of all foreign loans floated in the United States in that period.

From the habit of speaking of *countries* as lending or borrowing, it is easy to exaggerate the rôle played by *Governments* in connection with international finance. The United States Government, for example, has made no loans to other Governments since the war advances of 1917-20. International loans in ordinary times, on the lending side, result from the action of private individuals rather than of Governments. The lender is, in first instance, a banker or a banking syndicate who " underwrites" an issue of bonds. The actual lender, however, is the individual who invests his savings in the security. He exchanges his present capital for the promise of the foreign borrower to pay back the principal with interest over a period of years.

On the lending side, thus, both the initiative and the execution of the transaction are the action of individuals desiring to make a profit out of the marketing of securities. It is not the practice of the United States Government to ask bankers to loan money to foreign Governments or corporations. In this respect, American policy differs from the policy followed in the past by Governments of some lending countries.

On the borrowing side, however, the loan may result from the initiative of Governments, which may seek loans for a variety of purposes, such as to build railways or roads ; to drain swamps or build waterworks ; for refunding ; and for a great variety of other specific objects.

However elementary it may seem, it is nevertheless important to emphasize that in the United States the making of foreign loans is almost wholly a matter for private arrangement. It is for the individual underwriter to work out with the borrowing Government or corporation the particulars of the loan desired. Such negotiations determine the amount, the security and the use of the loan proceeds.

The Government of the United States is neither paternalistic nor imperialistic. It does not undertake to direct American capital into foreign rather than domestic channels. The choice is left to the free will of individuals. Nor are American loans a means whereby the Government seeks to extend economic or political control. The Government is not a party to loan negotiations.

But even though the Government does not figure in loan negotiations nor ordinarily have any active relation to them, a loan contract obviously may affect to a greater or less extent relations between the two countries. While no legal or formal control of lending has been felt to be warranted, the Government has felt it advisable to be informed of proposed loans by American bankers prior to their consummation.

The position of the Government is set forth in a statement on " Flotation of Foreign Loans" which was issued on March 3, 1922, by the Department of State. This statement said in part :—

> " The Department of State cannot, of course, require American bankers to consult it. It will not pass upon the merits of foreign loans as business propositions, nor assume any responsibility whatever in connection with loan transactions.* * * The Department believes that in view of the possible national interests involved it should have the opportunity of saying to the underwriters concerned, should it appear advisable to do so, that there is or is not objection to any particular issue."

In issuing this statement, the Government of the United States did not have specially in mind Latin American conditions, but rather the actual and potential position of American capital in relation to post war economic and financial problems.

In the five and one-half years since March, 1922, the Department of State has been consulted regarding scores of Latin American loans. Almost every case has been routine, without presenting any ground of policy for raising objection to the arrangements worked out between the American banker and the foreign borrower. In a very few instances, however, the Department has found it necessary to object to what it conceived to be unfair conditions, that is, where advantage was being taken of the inexperience of the borrowing country. This has led either to dropping the proposal, or to its modification.

The action of the Department does not mean, of course, that it has approved the soundness of these loans. The Department has always made it clear that it does not in any way pass upon the business merits of loan transactions, or assume any responsibility in connection with them.

Loans, if on a sound basis, are mutually advantageous. The borrowing country receives funds that accelerate its economic and social progress, and promote its general welfare. The advantages of introduction of foreign capital in promoting more rapid economic development, and consequent greater well-being for the masses of the people, are particularly obvious in such countries as the United States, Canada, Cuba and Mexico, in all of which foreign enterprise and foreign capital has had an important part in economic progress.

Sound and productive loans, therefore, are to be encouraged. It is, however, not always easy to say whether a given loan is or is not economically sound and productive, and the Department of State of course does not undertake to decide. Even with the fullest examination of the facts of a particular transaction, it may be hard for the impartial student of the matter to say whether it is wise or unwise. But if the borrower wants to borrow and the lender to lend, and the loan is made in good faith and involves no question likely to affect in any important way relations between the two countries, on what basis should the Government of the United States object ? Neither the American public nor the people of borrowing countries, it is believed, would wish the Department of State to act as a censor of the wisdom or of the soundness of such loans.

The statement has often falsely been made that American bankers are assured by the Department of State that loans going into default will if necessary be collected by force of arms. Nothing is further from the truth. No such promise has ever been made. Nor can any one cite an instance in which the American Government has used armed force for the purpose of collecting unpaid bonds held by American citizens.

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* From Ingenieria Internacional.

Also there has been considerable misunderstanding concerning the activities of American experts engaged by some Governments. A better understanding of the invaluable services which capable and high-principled experts have rendered is, however, dissipating criticism based upon ignorance. Americans are proud of the services which, for example, Professor Kemmerer has been able to render to many of the Latin American Governments. These Governments have engaged his services some times with and some times without the assistance of the Department of State. Americans also are proud of the services of other American financial advisors and customs experts, who have loyally served the Governments by which they have been employed and who have not used their position to benefit in any exclusive or preferential manner American commercial or other interests.

Where American experts have been engaged in connection with loan agreements, it has ordinarily been at the instance of the borrowing Government and the bankers concerned, who have joned in asking the good offices of the Secretary of State in procuring the appointment of a properly qualified and impartial person. The engagement of such a person has often permitted the flotation of a loan on terms which gave the borrowing Governments a credit higher than that enjoyed by strong European nations. Expert and impartial handling of the service of the loan has created in all circles confidence that there will be no default, and has thus avoided a development which might otherwise have led to complications and difficulties between the Government of the borrowing country and foreign Governments, the citizens of which have purchased the bonds in question.

In some cases American experts have served under the terms of treaties entered into between the foreign Government and the United States, as in the case of Haiti. Thus, according to the treaty of 1915 with Haiti the Government of the United States undertook to aid the Haitian Government "in the establishment of the finances of Haiti on a firm and solid basis." No serious and impartial student of the situation can overlook the tremendous benefits which American assistance has brought to the people of Haiti.

The Department of State also, at the request of the foreign borrower and the American lender, has in some cases agreed to use its good offices in referring to some high member of the American judiciary any disputes or disagreements arising under loan contracts. It is obvously highly desirable to provide a procedure available for settling any such questions.

In conclusion, it may be emphasized that American loans are not in any way a cloak for ulterior aims of the American Government. The United States has not sought and does not seek to create in Latin America an economic "sphere of influence" in which Americans enjoy in respect of commerce, concessions or financial matters any preferential or exclusive privileges as compared with citizens of other countries. The United States does not oppose the proper economic or financial aims of nationals of other countries in Latin America. Foreign loans by American bankers are the result of the play of economic forces, and not of action by the Government of the United States.

British Trade and Industry

By Gilbert C. Layton, Assistant Editor of "The Economist"

(Special to the "Far Eastern Review")

Britain's Heavy Industries: A New Investigation

IN previous notes we have referred to the plight of Britain's heavy industries and to the various remedies put forward. The position of these industries, as we have shown, leaves much to be desired and therefore every attempt to solve their problems is welcome. This particularly applies to the industrial investigation—or those parts of it concerning the heavy industries—conducted by the Liberal Party, whose investigating committee included distinguished economists and business men. The report is much above the level of the usual political propaganda and is indeed characterized by great fairness and ability. Discussing the reasons of the present depression in our iron and steel trades, the report says :—"It is pre-eminently a case of lop-sided productive capacity in which potential supply has greatly outrun demand. Largely as the result of the artificial stimulus given to this industry by the demand for munitions, the world's capacity for production is greater than ever before, while the steady growth of consumption which marked the pre-war period has not been maintained." The paucity of capital since the War and the very heavy depression in our shipbuilding industry have been especially heavy handicaps.

The report emphasizes the advantages of the British industry, but adds that "we (Britain) cannot maintain a large steel industry except on an export basis, for nearly half our present output is directly exported, while of the remainder almost a half is worked up in manufactures which we sell abroad." The remedy put forward in the report is familiar to our readers. "Our plant is not, on the whole, so up-to-date as that of Germany and Lorraine." The extensions made during the war were not designed to make the best use of the existing resources. "The industry, therefore, is in need of concentration and a better balancing of plant available for smelting pig-iron and making steel respectively—It is universally admitted that if our national advantages are to be exploited successfully, our industry must take measures to concentrate output in the plants best fitted for production."

The Coal Industry

Turning to the coal industry, the report, though perhaps more contentious, is not less noteworthy or suggestive. "The main cause of the present troubles of the coal industry," we read, "is the expansion of the capacity for coal production throughout the world, the stagnation of world-demand for coal and the contraction of the market for British coal. Though there has been a great extension of industry throughout the world in the last fifteen years, the world's consumption of coal has remained almost stationary.—This stagnant condition of the world-output of coal is the result partly of more economical methods of using fuel partly of the immense development in the use of oil both for firing boilers and in internal-combustion engines, and partly of the increased use of water power and of lignite." The difficulties of the British coal industry have been enhanced by special problems peculiar to Great Britain. "The British coal industry has suffered to an unexampled degree from the antagonism between the mine-owners and the miners."

The recommendations bear a striking resemblance to those of what is popularly known as the Samuel Commission, which is not surprising in view of the fact that Sir Herbert Samuel, the chairman of the last Royal Commission on the coal industry, was a mmber of the Liberal investigating committee. The mineral royalties should be acquired by the State and placed under the administration of an expert body of Coal Commissioners. "The Commissioners should encourage and facilitate amalgamations where these are likely to produce increased efficiency, but purely financial amalgamations, which have in some cases done harm to the industry, should be prevented." Selling agencies on behalf of large groups of collieries, and other means of improved marketing, should be introduced. Those municipalities which wish to do so should be empowered to engage in the retail sale of coal. Research in the utilization of coal should be encouraged by the State. Recommendations are made for improving labor conditions. In short, the report is an excellent statement of the enlightened point of view regarding the problems of the heavy industries.

Industrial and Railway Amalgamations

The foregoing paragraphs and previous articles in this column indicate that there is, at any rate in enlightened quarters, a substantial demand for amalgamation in British industry. Public opinion has recently undergone a remarkable and significant change in regard to the large business unit. A few years ago there was implacable hostility, but to-day there is a certain measure of sympathy. Sir Josiah Stamp, the eminent economist and chairman of Britain's largest railway, devotes a chapter to this aspect of amalgamation in a thoughtful pamphlet entitled "Industrial and Railway Amalgamations" (published by the London General Press, London, price 2/–) "The public attitude to combinations" he says, "has markedly changed of late years." Doubtless this is partly due to the fact that "The question whether large combinations do actually charge higher prices or sell worse quality goods than a number of competing units, has been pretty effectively answered in the negative by the facts of recent years."

In view of Sir Josiah Stamp's intimate connection with mergers, considerable importance attaches to his view that "there is a general tendency in popular discussion to exaggerate the simple economies of straight-run standard lines possible through concentration and to underestimate the costs of bringing them about." He develops this thesis, quoting figures from experience, in a chapter on the economic aspects of amalgamations. In an important section of the pamphlet Sir Josiah Stamp contrasts amalgamations in general with railway amalgamations. He points out where the two classes of amalgamations are not comparable and indicates the particular advantages accruing to railways as a result of persuing a policy of amalgamation. There is a particularly valuable treatment of railway amalgamations in America, in which the author declares that "My own experience of the American viewpoint on amalgamation, so far as railways are concerned, is that it is much less acquiescent than in the case of manufacturing establishments." This finds reflection, as Sir Josiah shows, in the tardy progress in the direction of amalgamation.

Opening of a Permanent Conference for Soya Bean Investigations in Harbin

IT may be said without exaggeration that in our days soya beans are among the most widely distributed agricultural products in the world. They are being utilized in Indo-China, India, the Malay and South Sea islands, in Australia, Egypt, Italy, France, Germany, Austria, England, Argentine, the United States of America, the U.S.S.R. and in Canada, everywhere, where the summer is warm enough to allow them to ripen.

Since ancient times soya beans have been cultivated in China. They are first mentioned in an old Chinese pharmacopoeia, a book written, according to tradition, by the emperor Shennung in 2838 B. C.

As soon as the construction of the Chinese Eastern Railway had opened North Manchuria to an extensive inflow of Chinese immigrants, the soya beans, particularly their yellow variety (export beans), have taken the first place in the list of plants cultivated in this territory. At the present time yellow soya beans occupy about 33 per cent. of all the fields in the agricultural districts of the area tributary to the Chinese Eastern Railway, and in the past three years—from 1922 to 1925—their output increased by 34 per cent. and the quantities of beans hauled by the railway have grown during 12 years—from 1912 to 1924—from 23.4 to 102.3 million poods or by 337 per cent.

China yields more than one half of the total world's export surplus of soya beans, whereby over 80 per cent. of Chinese exports of beans come from Manchuria. Beans and the products manufactured from them form the connecting ling between the local farmer and the world market. Hence one can understand the tremendous economic importance of soya beans in the economy of Manchuria and the attention given this subject on the part of a great number of government, public and commercial organizations in the country.

Up to the present time, however, all these organizations have been acting independently from one another, without any mutual exchange of experience and often performing one and the same work two times, which has caused useless throwing away of money and waste of force.

Thus, many questions regarding the study, growth distribution and utilization of beans have been thrashed out simultaneously by such institutions as the government experimental farms at Ninguta and Tsitsihar, the experimental field of the Chinese Eastern Railway, a part of the staff of the Agronomic Section and Agricultural Laboratory of the Land Department, several employees from the Mixed Storage Section of the Commercial Department of the Chinese Eastern Railway and the Economic Bureau of the Chinese Eastern Railway. Others interested in the problem are the Commercial and Industrial, Natural History Agricultural Sections of the Manchuria Research Society, and the Experimental Farm and formerly owned by the Manchurian Agricultural Society. These questions are also treated by the Experimental Farm of the South Manchuria Railway at Kungchuling. A great many matters concerned with this problem are studied by individual persons, who are members of the Union of Chinese Chambers of Commerce in the Special District of the Eastern Provinces, the Harbin Bourse Committee, Provincial District and Rural Chinese Agricultural Societies. Great attention is given the subject by local banks, individual exporters and representatives of the Bean Oil Mills Association.

Therefore, the creation of a competent and authoritative combine among the parties interested in the growing and sale of beans was one of the most important issues in the country.

The initiative for such a combine was made by the Manchuria Research Society a year ago, when at the meetings of its Commercial and Industrial Section the creation of a combined organ for studying and utilizing beans was suggested.

A short time ago this idea was put into effect.

At the meeting of the Committee of the Manchuria Research Society of December 14, 1927, an Organizatory Bureau of a Permanent Conference for Soya beans Investigation was formed, consisting of Messrs. Chang Ting-kuo, Chairman, A. A. Neopihanoff and I. K. Kabalkin, Vice-Chairmen and A. V. Marakueff and M. K. Gordeef, Members.

The objects of the Permanent Conference are laid down in its Constitution, as follows:

(*a*) The bringing together of all persons and corporations interested in the study of the production, distribution and utilization of soya beans for the purpose of mutual Co-operation and Co-ordination of efforts.

(*b*) Assistance to an extensive study of questions referring to soya beans of Manchuria and the rest of China.

(*c*) Assistance in the work for selecting different varieties of soya beans, as possessing a greater force of resistance or adaptibility in different branches of industry.

(*d*) Assistance to the investigations of the question of diseases of the beans and insect depredations and of means of fighting them.

(*e*) Stimulating of interest toward the improvement of seeds on the part of the farming population of Manchuria, assistance to giving of prizes for better seeds, distribution of the better varieties, description and nomenclature of different varieties of soya beans.

(*f*) Establishment of market standards and grades of Manchuria soya beans, as well as popularization of the best methods for sorting and cleaning the beans for sale on international markets.

(*g*) Investigations of the special economic features of the growing of soya beans in Manchuria, and the Manchurian trade in beans and their products.

(*h*) Investigation of the question of a rational application of bean cultures in the rotation of crops in Manchuria and neighboring districts.

(*i*) Discovery of means for a profitable utilization of bean waste (shells, straw, etc.).

(*j*) Assistance to the opening of experimental fields, holding of conferences, exhibitions, and competitions.

(*k*) Publishing and republishing in the Russian, English and Chinese languages of the most valuable works on soya beans and translation of similar works appearing in other languages.

(*l*) Discussion and enforcement of any other questions connected with the investigation and utilization of soya beans.

According to the idea of the initiators, the membership of the Conference should include all persons and corporations whose activities assist in the obtaining of the results as proposed in the above program : the Manchuria Research Society, several departments of the Chinese Eastern Railway, the Chinese Chamber of Commerce, the Land Department of the special Area of the Eastern Provinces, local banks, exporters, experimental farms and agricultural associations, etc. A number of prominent executives have accepted the invitation of the Organizatory Bureau.

Both the scope of activity of the Permanent Conference and its proposed composition permit to hope that the Permanent Conference will in a short time become a factor of tremendous business importance for the country. Already now it may be asserted that it will receive moral and material assistance from a number of local organizations, firms and persons.

These is no doubt about this, because individual and separate actions of public and business circles in the investigation of soya bean problems, the utilization of beans, their transportation, manufacturing and export to foreign markets are detrimental to the economic system of the country as a whole, and consequently also to its component elements. The complicated conditions prevailing in the current year upon the world market for beans andt he reappearance of unfavorable factors for the sale of beans and their products in consuming countries show that united action is both necessary and timely.

The Organizatory Bureau believes that the work of the Permanent Conference, when placed upon a sound basis, will by its very idea turn it into a serious authority not only within the boundaries of the country but also beyond, and that its activity will assist in increasing bean exports from Manchuria and thereby further the economic prosperity of the country. Besides it will help toward a rapid solution of all questions connected with exports.

One may also presume with certainty that the voice of the Permanent Conference will be listened to very attentively in the future by the business circles in the world centres for bean trade, because Manchurian soya beans yield over one-half of the exportable surplus of this product. In this respect the Permanent Conference for soya beans investigations proposes the calling of conferences, and from this standpoint it would perhaps be timely to raise the question of holding an International Conference on soya beans in 1929. The obvious place for holding such a conference is Harbin, which is the centre of the bean industry in Manchuria.

The conference would be of particular interest if it were held in summer time (best in August) and connected, as usual in such cases, with excursions to agricultural experimental establishments, mills and laboratories both in North and South Manchuria, Nikolsk and Suigen (Central Experimental Station of Korea, near Seoul).

In order to make the conference a success an understanding should be reached for the summer of 1929 between the works of experimental institutions of the Chinese Eastern Railway (Harbin, Echo, Anta), the South Manchuria Railway (Kungchulin, etc.), the Chinese government (Mukden, Kirin, Chengchiatun, Tsitsihar and Ninguta) and Far East of the U. S. S. R. (Nikolsk-Ussurisk and Blagovechensk). This would be possible by holding preliminary meeting not later than the middle of the coming 1928 year.

The above shows that the work of Conference will have to proceed in the closest contact with such scientific institutions as are studying the enumerated problems in other countries, which are all interested in the questions concerned and have reached quite important results. It is understood that only when all members are following one aim and receive support from everywhere, will the results be happy. Such universal attitude forward this word may only be obtained by the means of thorough mutual information and understanding on the plan of works.

Therefore the Presidium of the Permanent Conference for soya beans investigations hereby makes an appeal to all organizations working in the same domain, requesting them to send in materials, reports and so forth ; on its part the Presidium of the Permanent Conference for soya beans investigations will gladly undertake in the future to become the intermediary between organizations in Manchuria and the rest of the world for an exchange of seeds, publications, etc.

All communications and inquiries in this matter should be addressed as follows :

Permanent Conference for Soya Bean Investigations.
C/o Manchuria Research Society.
Harbin, China.

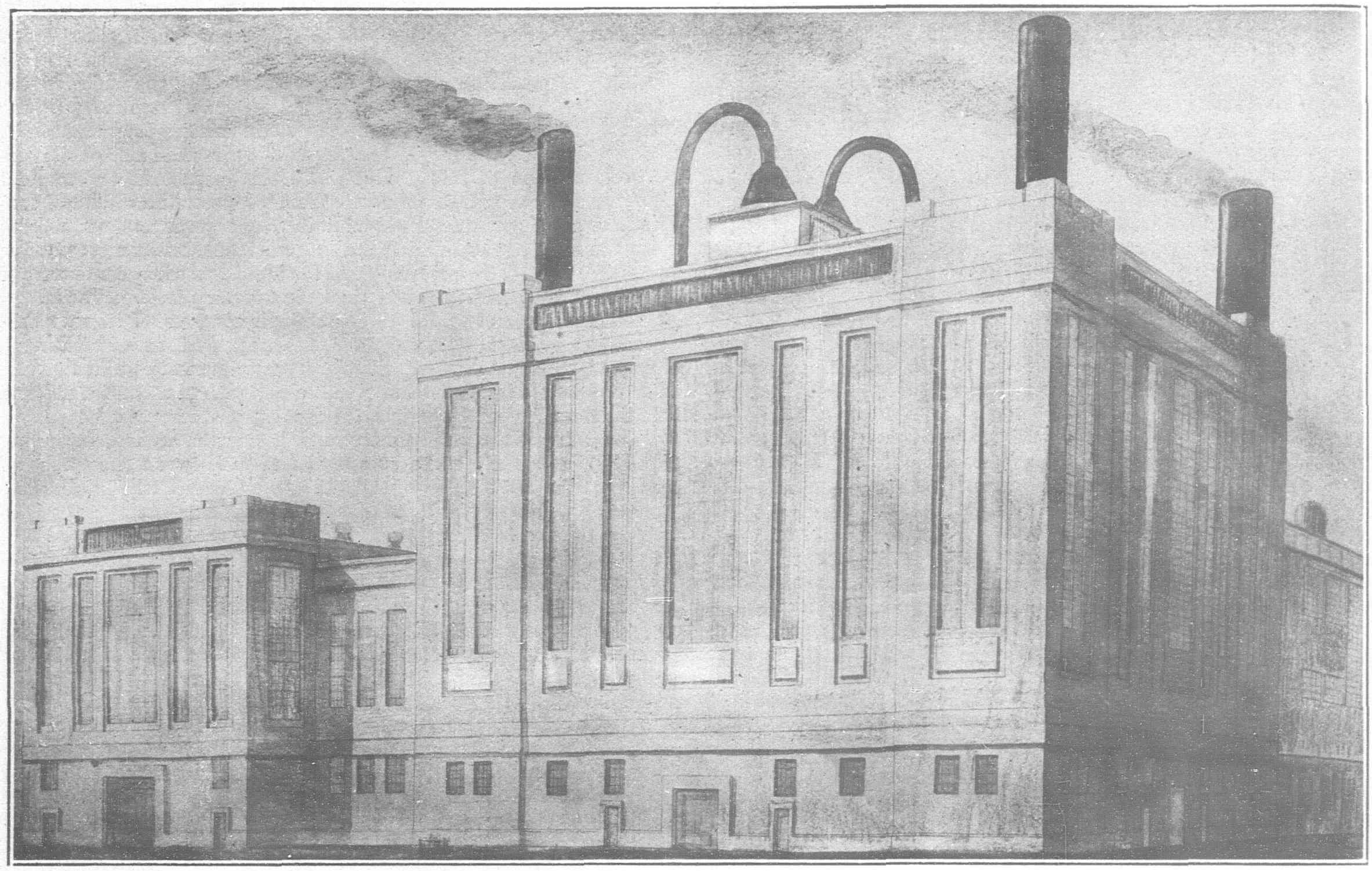
American Trade with Manchuria

FROM figures compiled with regard to American trade with China by Mr. Julean Arnhold, U.S. Commercial Attaché at Peking, the interesting fact appears that American trade with Kwantung (the Japanese Leased Territory through which the greater volume of trade with Manchuria passes) has been proportionately far more prosperous than has been American trade with China Proper, which seems a rather pertinent commentary on the " Open Door " situation there which has at times give rise to uninformed complaints which the figures show to be entirely unjustified.

Thus, while American exports to China Proper showed a very material decrease in 1927 as compared with 1926, American exports to Kwantung during the same period showed a fairly substantial increase. Still more important is the fact that while in the case of China Proper, American exports last year were not much than half of the amount of American exports from China, causing an unfavorable trade balance of over $62,000,000, the exactly opposite condition obtained in respect to American trade with Kwantung, where the value of American exports almost doubled the amount of the imports, resulting in a trade balance favorable to the United States of almost $3,000,000. Furthermore, in this connection account must be taken of the fact a very large volume of American imports to Kwantung is imported through Japan, so that such trade does not appear in the above mentioned figures, while American exports are usually made direct, so that the difference in favor of America is far greater than appears in the figures given. The figures in detail are as follows:

American figures of trade with China in G.$

Exports to China	83,511,000	1927
,, ,, ,,	110,205,000	1926
Export decrease	26,694,000	
Exports to Kwantung	6,698,000	1927
,, ,, ,,	6,465,000	1926
Export increase	233,000	
Imports from China	151,783,000	1927
Exports to China	83,511,000	1927
Balance adverse to U.S.	68,272,000	
Exports to Kwantung	6,698,000	1927
Imports to Kwantung	3,730,000	1927
Balance favorable to U.S.	2,968,000	



Drawing of the Main Power Plant in Shanghai
Note: The New Dust Catchers Fitted to the Stacks

New Extension to Shanghai's Electricity Plant

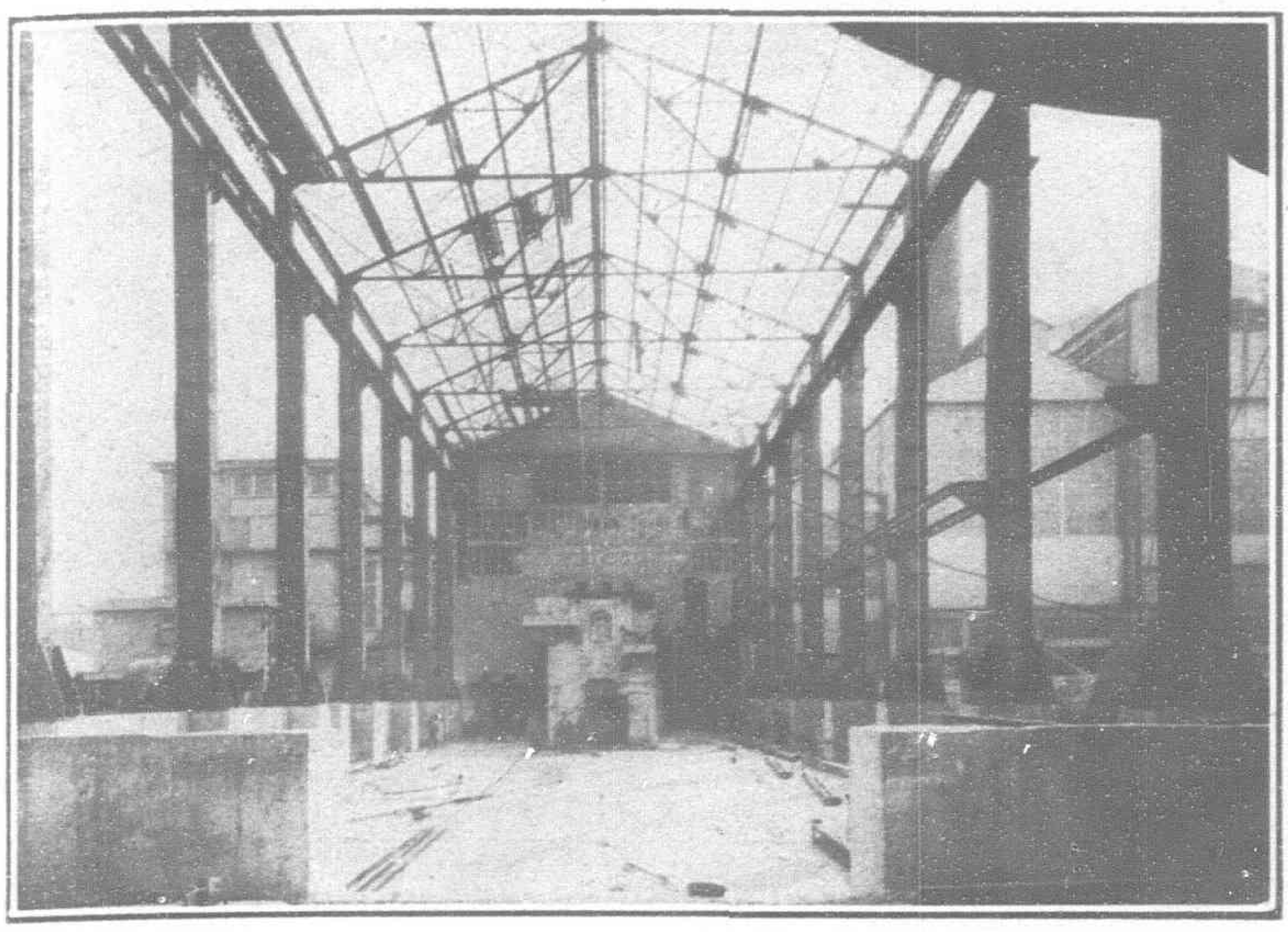
ABREAST of the expansion of business generally in this leading metropolis of China and prophetic of the gaining hold of industrialism in the Far East, is the building on the part of the Shanghai Municipal Electricity Department of an extension to its main power plant at Riverside, increasing by a third the potential output of this plant, which already is one of the largest in the Far East and has a capacity of 120,000 kilowatt.

The extension now in progress of construction, to be completed within the next few months, comprises chiefly the installation of two additional 20,000 kilowatt turbo-alternators. Along with these are four boilers with pulverized fuel equipment, each of the boilers having a steam generating capacity of 140,000 pounds per hour normal and 185,000 pounds per hour maximum at a pressure of 350 pounds per square inch and temperature of 700 degrees Fahrenheit.

The Riverside Power Plant

The extension which is so fully described by the accompanying photographs that little written material is needed, has been necessitated by the ever-increasing demand for power. It is one of continual additions made to the plant ever since its inception and is based on consumption figures which show a steady increase even during times of great political turmoil of a third in the demand for power every two years. In 1924, for example, a total of 333,877,088 units were sold, as contrasted with 444,412,352 in 1926, even despite the strikes and boycotts subsequent to the May 30, 1925, incident. In the year 1928, it is anticipated, the total will run well over 550,000,000 units.

In design, each of the present extensions has been well in keeping with the best prevailing practises and this, coupled with the efficient operation, which has stamped the Shanghai Department



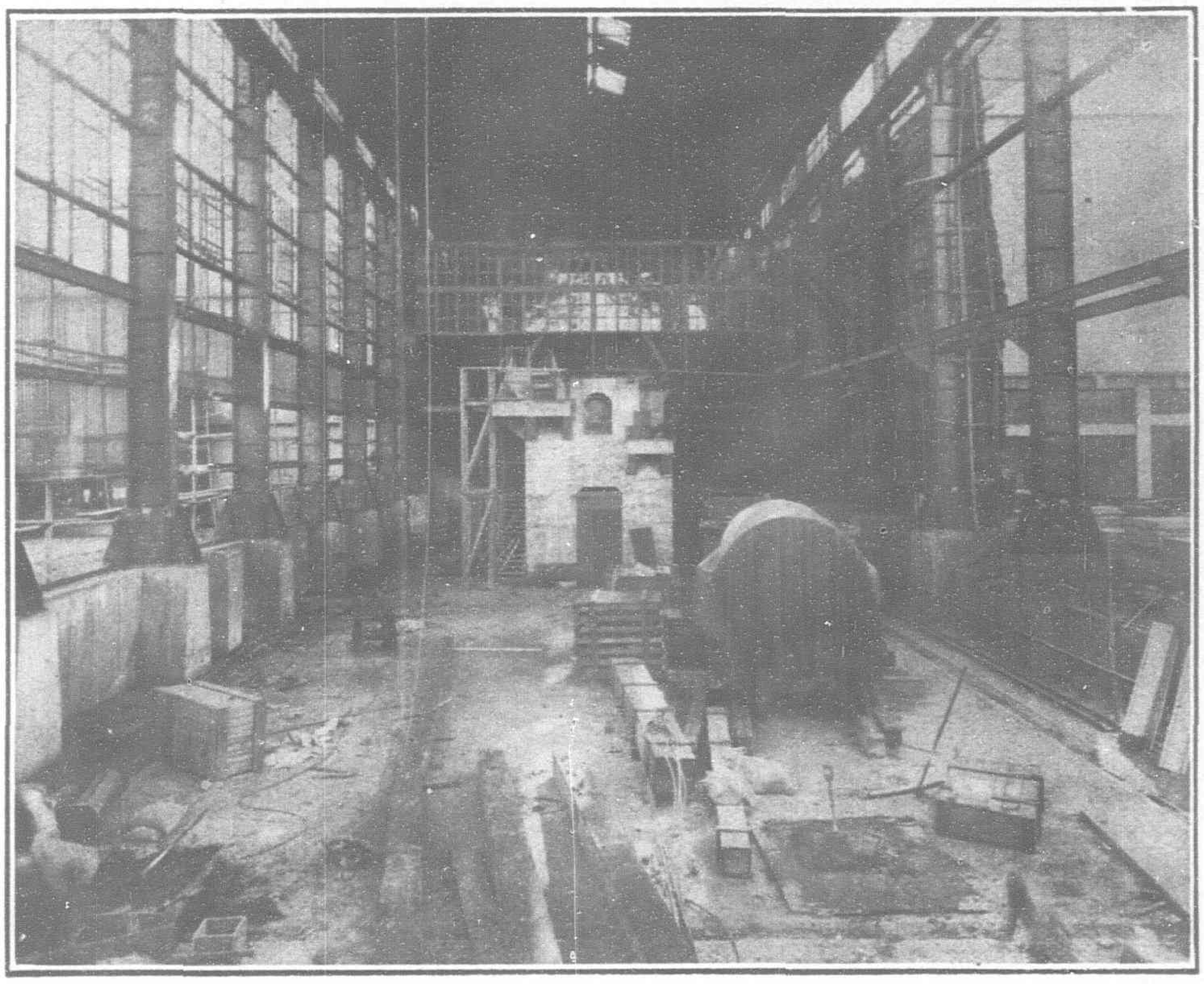
Erection of Steelwork, End View, Turbine Room

Reconstruction of Roof Over No. 1 Pump House

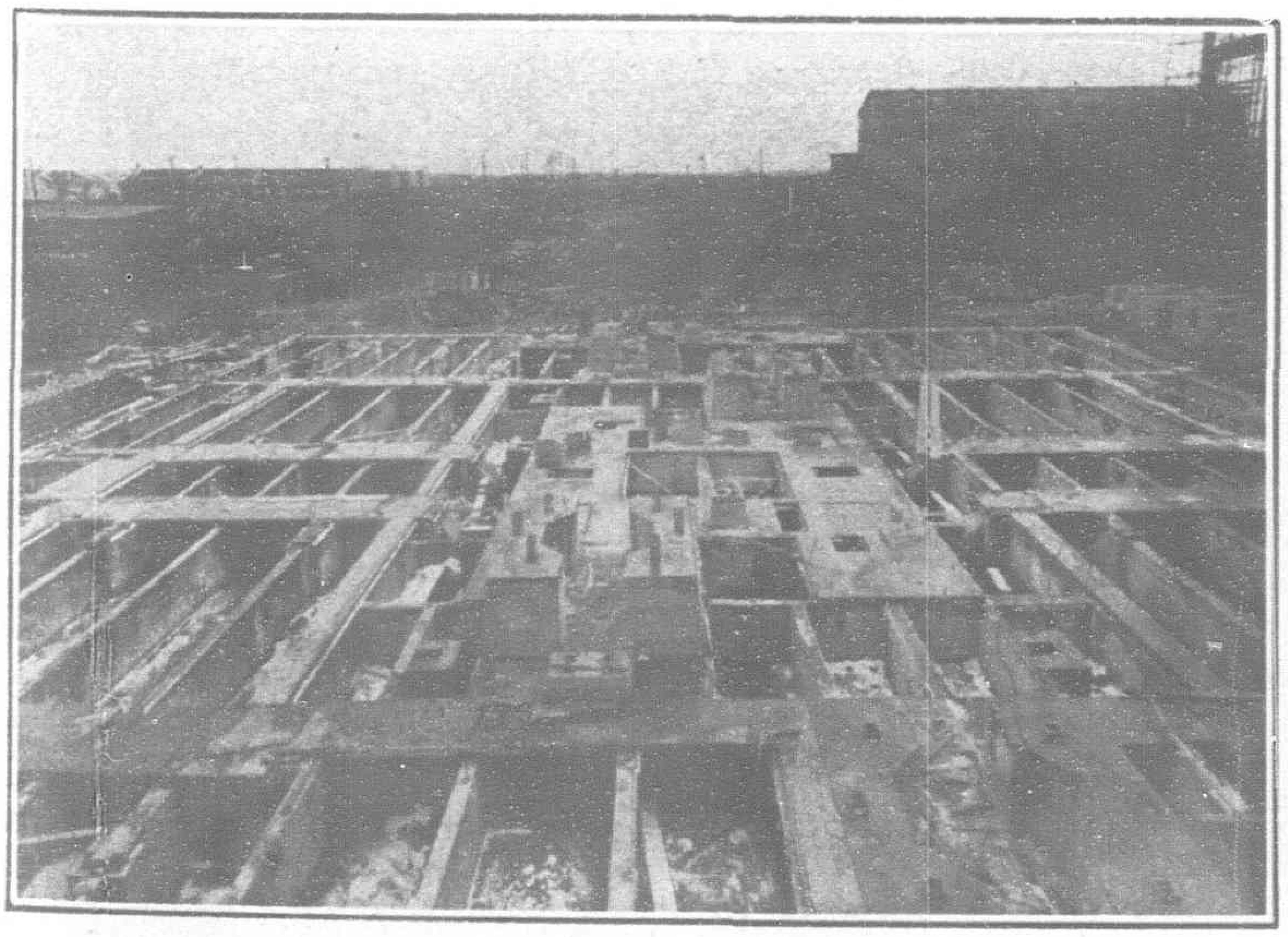
as one of best-managed in the world, has resulted in thermal efficiencies of a very high order and low production cost, both of which compare favorably with the best results obtainable by other undertakings of similar size. The Department in its quest for still better results has spared no effort, and in this extension, calculated to be the best which can be procured for the production of cheap electricity consistent with reliability of supply, it is expected to improve upon the record load factor of 61.79 per cent. to yield an even higher return on the capital outlay which reached its peak of 12.31 per cent. last year, and to cut the rates on power, if possible, to conform with the low schedule recently reached of three tael cents for purposes of domestic supply.

At the present moment, the use of mechanical stokers has limited the Electricity Department in its choice of suitable fuel and the adoption of pulverized fuel equipment for this extension to the plant offers many new advantages, inasmuch as it introduces a wider field in the purchase of fuel, and with this system of firing it will be possible to burn efficiently certain grades of cheap coal which cannot be used on existing mechanical stokers.

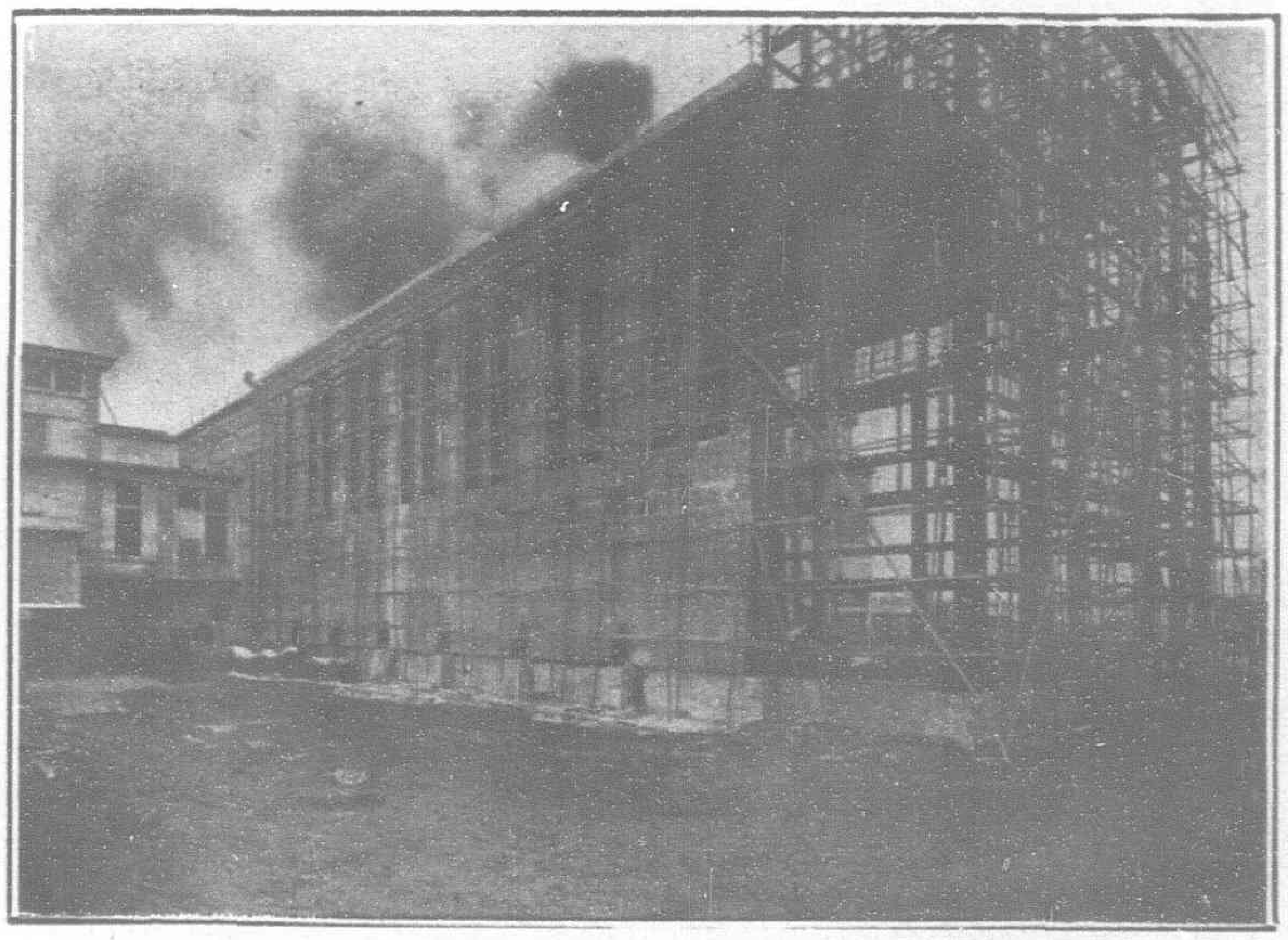
As an evidence of the up-to-date



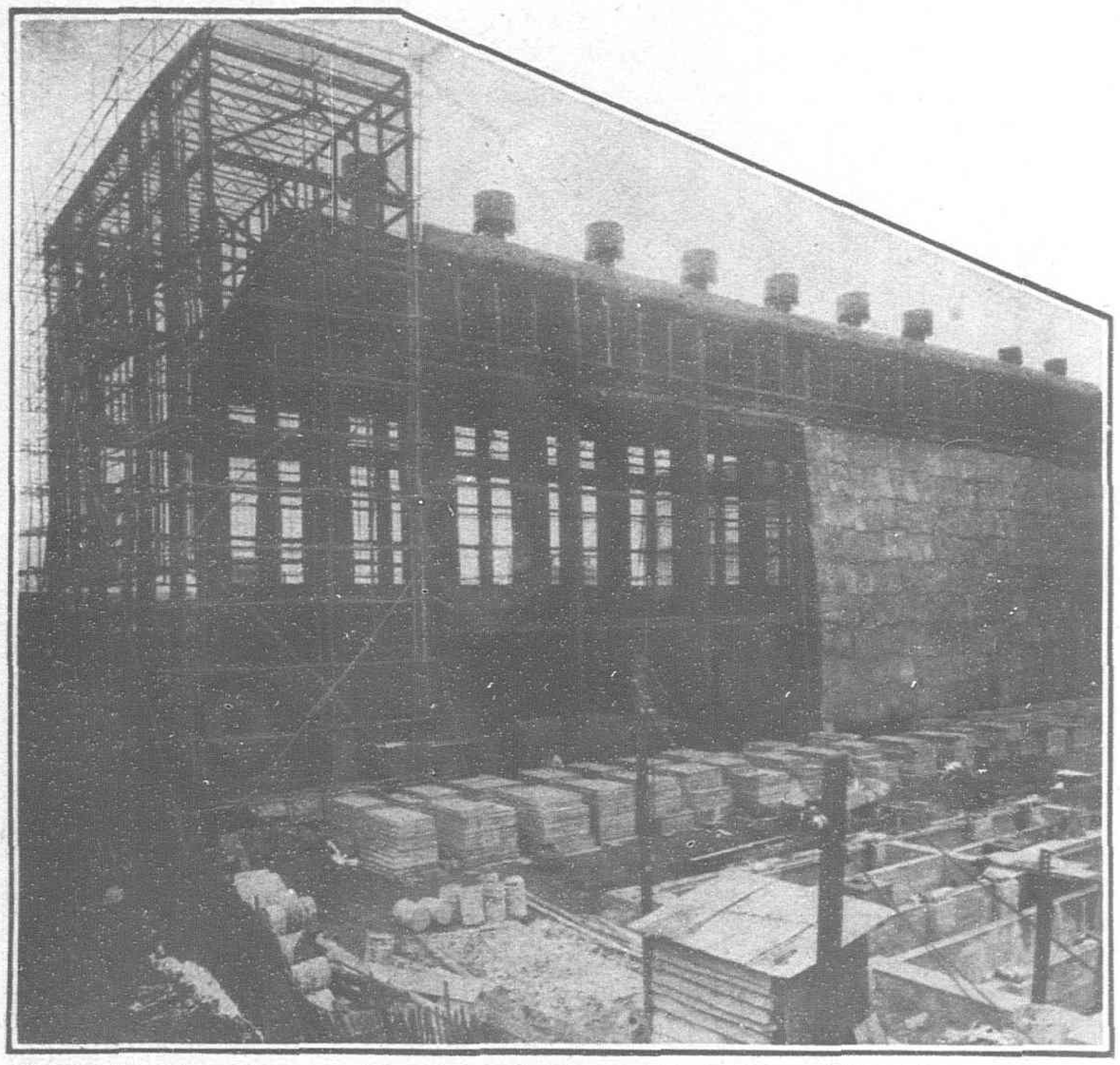
Erection of Steelwork, Turbine Room, End View



Foundation of No. 4 Boiler House, 1926 Extensions



Turbine House, North and East Elevation, 1926 Extensions



1926 Turbine House, North and West Elevation, 1926 Extensions

methods which have been employed in this plant, it may be noted in the photograph of the outside of the present main power plant, that dust-catchers have been fitted to the stacks with a view to eliminating the dust nuisance. This apparatus effectively separates the dust from the flue gases and deposits it in a receptacle at the base of the stack, from which it is removed periodically. It is an improvement which has not come into vogue generally in many American cities and the universal adoption of which in Shanghai is being urged to make this city among the cleanest in the world.

While this new extension is rapidly nearing completion, the Department already has undertaken plans for affording an even greater scope to the work during the next few years, plans which are being held in abeyance until they are in more definite form.

It is to Mr. T. H. U. Aldridge and Mr. C. S. Taylor, engineers-in-chief of the Department that credit is chiefly due for the building of such an enormous and eminently successful system, a system which offers such pronounced advantages as to invite the industrialist of whatever nationality to locate new ventures within the area which is served by the Municipal Department.

Most of the material for the new venture comes from England and America. To an investment in the whole department which already amounts to 32,000,000 taels, or about 20,000,000 gold dollars, the increase soon to be completed represents an added outlay of several millions more.

More specifically, the material being used in the building of the extension is supplied by the British firm, Metropolitan Vickers Electrical Co., Ltd. for turbines and alternators, the boilers from the British firm of Babcock & Wilcox, Ltd., the switch gear from The British Thomson-Houston Co., Ltd. and the transformers from the International General Electric Company, Inc. The new pulverized fuel equipment comes from the International Combustion Company, which is an Anglo-American firm, the Municipal Electricity Department having negotiated the purchase through the British agency.

Book Reviews

PIONEER RAILWAY ENGINEERING by H. STRINGER, B.A. (Cantab.) A.M.I.C.E. London, H. F. and G. WITHERBY.

The aims of this book as laid down in the Preface are as follows :—

(1) To study and lay emphasis upon the economics of a branch of engineering now perhaps most vital to the world's progress.

(2) To concentrate for the use of the pioneer engineer information now scattered throughout many standard works.

(3) To bring together from the notebook of the executive engineer those variations in practice decreed by climatic and economic considerations prevailing outside Europe.

(4) To provide a framework to be amplified by the experience of the reader. For this purpose every chapter heading and sub-heading is interleaved for notes.

The book is divided into ten chapters, the following being the chapter heads :—

(1) Railway Economics. (2) Railway Location and Survey.

(3) Conduct of Construction, Notes on Transport, Plant and Machinery.

(4) Earthwork.

(5) Temporary Bridges, Trestles, etc., Culvert and Bridge Construction.

(6) Track and Track Maintenance.

(7) Staff Quarters and Building Construction Notes. Notes on Workshops and other special Railway Structures.

(8) Water Supply. (9) Stations and Signals.

(10) Notes on Reinforced Concrete and Steelwork.

The book has a special appeal to engineers of all classes in China. It is the work of an engineer who has spent thirteen years in the service of the Chinese Government railways, and who has therefore had to meet those many sided problems in all branches of the profession which fall only to the lot of the railway engineer employed in the early development of a new country.

Thus, though written mainly from a railway point of view, a good deal of space is devoted to general construction, buildings, shops, water supply, etc.

THE CHINA YEAR BOOK, 1928, edited by H. G. W. Woodhead, C.B.E. Tientsin, "The Tientsin Press Ltd."

Year by year with almost amazing toil, Mr. Woodhead produces that unusual compendium of information with regard to things Chinese, The China Year Book. Year by year this volume grows larger and bulkier and contains more exact and valuable information. Perhaps the only source book of any importance, in China, it manages within its covers to contain so much detailed data that no one would ever think of reading it from cover to cover; yet no one can write or speak or plan with regard to China without constant reference to it.

The usual chapters are brought up to date each year and one somehow wonders whether Mr. Woodhead might not find some way of omitting a few of them without the whole book losing its value. His difficulty apparently is that the reader buying this year's book alone, could not, with decency, be referred back to previous volumes, and yet, somehow, as events in China occur with greater rapidity and as more and more information with regard to the country is made available, the problem of the increasing size of the Year Book will have to be solved in some way. This year's volume with the index runs to 1,439 pages, which is almost too large and yet what could have been left out? The chapter on Finance, for instance, is brought right up to date and includes the finances of the Nationalist Government, of the Peking Government, the whole subject of secure and unsecured loans, the Customs and Salt Gabelle and the various Shipping gives a very complete summary of piracy. There are 12 pages of documents with regard to the Nanking Outrage. The British Concessions at Hankow and Kiukiang are dealt with in about 20 pages which are heavily documented. The whole story of Sino-Russian incidents during the year, beginning with the seizure of the Pamiat Lenina to the Red Terror in Shanghai and the disclosure of the British Government, are given minutest attention. There are 100 pages of material on Labour which begins with a discussion the Cost of Living and a general compilation of prices, wages and hours and goes through the whole question of Strikes, Boycotts and labour disturbances and finally leads up to the connections between labourers and the Communist Party of China.

This year's special feature of the volume is the history of the Kuomintang by Mr. George E. Sokolsky, Associate Editor of the FAR EASTERN REVIEW. This history is unusual in that for the first time, perhaps, in English, all the data existent up to September of last year is summarized and published in about 100 pages of the China Year Book. This history goes back to the days long before the Revolution of 1911 when Dr. Sun began to organize the Revolutionary Movement and ends with the September Government in Nanking and the details of Kuomintang organizations. It will be advantageous to any one attempting to understand the extraordinary influence of this Party to read this chapter of the China Year Book and to possess himself of this background of current events in China.

American Capital for Manchurian Railways

By Mr. K. K. Kawakami

THE reported loan negotiations between the South Manchuria Railway and J. P. Morgan and Company has attracted considerable public attention. Whether the negotiations succeed or fail, facts relative to the status of that Japanese railway should be carefully considered.

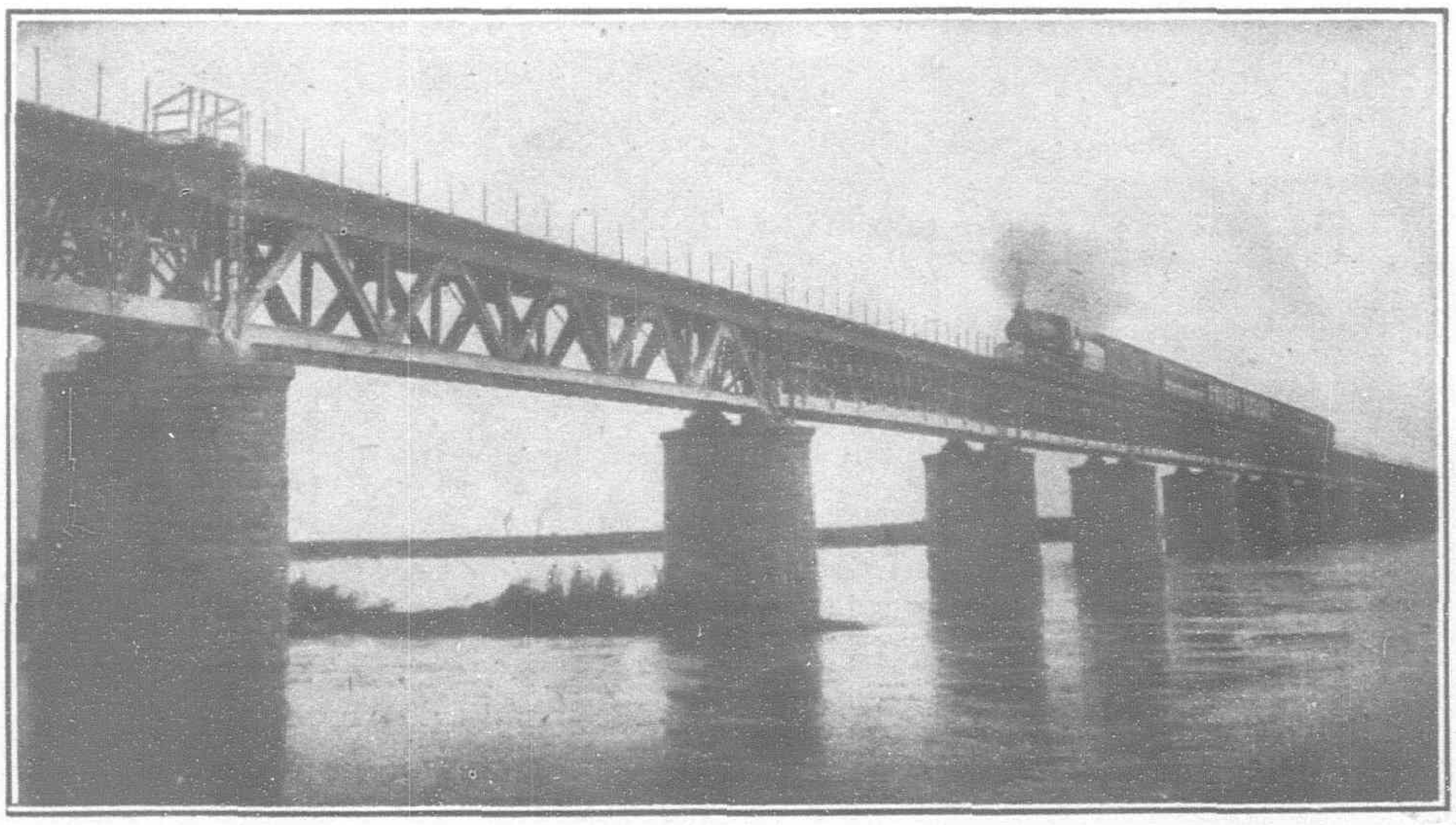
Originally built and owned by Russia, this Manchurian line was transferred to Japan by the Portsmouth Peace Treaty of 1905, which ended the Russo-Japanese war. To confirm this transfer Japan in December of the same year made a separate treaty with China. In the protocol to that treaty China agreed, as she had done with other countries in similar cases, not to build parallel lines to the South Manchuria Railway (The common assertion that this agreement was a result of the twenty-one demands is entirely wrong).

Had Japan known that China had been in secret alliance with Russia and had clandestinely helped Russia throughout the war, she might have been far more exacting in dealing with the Chinese Government. That secret Russo-Chinese treaty of alliance had been most carefully guarded, and was never officially published until China was forced to bring it out at the Washington Conference of 1921. While Japan was fighting against Russia to preserve China's integrity, China, by virtue of that secret treaty, facilitated and expedited Russia's military operations in various subtle ways. Japan, however, went no further than obtaining from Russia, not from China, some of the rights which the Peking Government had given the Czar.

As soon as the Portsmouth treaty was signed the late Mr. E. H. Harriman tried to secure a half interest in the Manchurian railway. But Japan could not see her way clear to accept the overture, as the railway was the only valuable property given her as the result of the war which cost her a hundred thousand lives and a billion dollars. Nor did President Roosevelt extend active support to the Harriman project. His policy towards Japan was summed up in these sentences in his letter to Mr. Taft :—

" Our vital interest is to keep the Japanese out of our country and at the same time to preserve the good will of Japan. The vital interest of the Japanese, on the other hand, is in Manchuria and Korea. It is therefore peculiarly our interest not to take any steps as regard Manchuria which will give the Japanese cause to feel, with or without reason, that we are hostile to them, or a menace, in however slight a degree, to their interests."

Naturally Mr. Roosevelt deeply deplored the policy initiated by Secretary Knox under the presidency of Mr. Taft. He characterized that policy as " ill-advised " and " combining irritation and inefficiency." At any rate the Japanese saw in Mr. Knox's proposal for the " neutralization" of the Manchurian railways the revival of the Harriman scheme in camouflage.



S.M.R. Bridge Across the Honho River

The next American project to gain a foothold, or as the Japanese saw it, to undermine the Japanese position, in Manchuria was conceived by Willard D. Straight, then American Consul-General at Mukden, Manchuria. It was plainly the resuscitation of the Harriman project. Briefly it proposed to build a trunk railway through Manchuria between Chinchou and Aigun, a distance of some 1,000 miles. It was evidently a scheme to put the Japanese in Manchuria out of business by lining up American, British, French and even Russian capital against them. Why Straight in his earlier days cherished a grudge against Japan is a mystery. In outlining his scheme in a letter to Morgan and Company Straight said :

" English and American capital, together with French capital, should be used to bolster waning Russian prestige in the Orient, besides ensuring for themselves the political support of the Russian Government in their enterprise in Manchuria and Mongolia. Leaving Siberia out of discussion, the most promising field for the Group's Eastern activities would be Manchuria and Mongolia. It should in these regions be possible to act as China's partners, not as lenders alone, for the political situation, particularly in Manchuria, forces China to grant terms more favorable than could be secured elsewhere, while in neither region is popular sentiment, a growing obstacle to foreign investment in South China, an important factor."

It was the irony of fate that Russia, for which Straight had a kindly feeling, objected to the Chinchou-Aigun railway project more vigorously than Japan did. Japan, in fact, acquiesced in it on condition that the South Manchuria Railway be permitted to build a line to effect a junction with the proposed American line. But due to Russian opposition and various obstacles from Chinese sources, Willard's grandiose scheme was abandoned. In his later years Straight was a wiser, if disillusioned, man. As Mr. George Marvin, vice-consul at Mukden under Straight, tells us, " Chinese incompetency, dilatoriness, utilitarianism and downright dishonesty slowly alientated the warm sympathy of his (Straight's) earlier dreams. Correspondingly he came, in his own exasperation, to realize more clearly some of the conditions with which successive but unsuccessful Japanese ministries had been contending."

" As Straight," says Professor Paul H. Clyde, of Ohio University, " looked back on those active years when he was carried forward in the whirl of Far Eastern politics by his own brilliancy and youth, he changed his views and sympathies on things Chinese and things Japanese." In his closing years, indeed, he found it practicable to co-operate with the Japanese rather than with the Chinese or the Russians. When in 1917 Straight secured a contract with the Chinese Government to improve the Shantung canal, he admitted Japanese interests into the enterprise.

The Morgan loan, if concluded, will be the first profitable American investment in Chinese railways. Besides the Harriman and Straight projects, a few attempts have been made by American financiers and entrepreneurs to enter the Chinese railway field, but chiefly owing to the distracted conditions in China none has been successful.

The South Manchuria Railway Company was organized in 1906 in accordance with the commercial law of Japan with an authorized capital of $100,000,000, shares of which were equally divided between the Japanese government and the investing public. The Chinese Government was invited to subscribe to the shares allotted to the Japanese Government, but the invitation was declined on the ground that there was no available land for the purpose. The company operates 437 miles of the main line from Changchun to Dairen with branch lines totaling 261 miles. In addition it undertakes mining, iron works, marine transportation, improvement of lands, public works, sanitation, and education in the railway zone.

It is interesting to recall that Mr. Thomas Lamont, who is now considering a substantial loan to the South Manchuria Railway, played in 1918 the leading part in organizing an International Financial Consortium for the financing of China. The consortium has been almost forgotten, and among the Chinese it has been especially unpopular. Nevertheless it is still in existence, and it may well be asked whether its principle does not conflict with the proposed Morgan loan to the South Manchuria Railway. The answer is plain in the agreement of the consortium made in May, 1919. Article 1 of that compact provides that agreements and options relating to industrial undertakings in China, including railways, upon which substantial progress has been made, need not be pooled in the consortium. The British Government, explaining the scope of the consortium to the Japanese Government, stated that it was "prepared to subscribe to a written assurance to the effect that the Japanese Government need have no reason to apprehend that the consortium would direct any activities affecting the security of the economic life and national defense of Japan." It also assured the Japanese Government that Japan could "firmly rely upon the good faith of the Powers concerned to refuse to countenance any operations inimical to such interests" of Japan.

Practically the same assurance was also given by the American Government. Consequently the final consortium agreement reached in May, 1920, excluded the following railways in Manchuria, then built, building or projected from the scope of the consortium :

(1) The South Manchuria Railway and its branches, 690 miles, owned by Japanese.
(2) Projected Kirin-Huinin line, about 270 miles, to be built and owned by the Chinese Government, financed by Japanese.
(3) Projected Kirin-Kaiyuan line, about 230 miles. Ditto.
(4) Projected Changchun-Taonanfu line, about 180 miles. Ditto.
(5) Supingkai-Taonanfu line, about 190 miles. Financed by Japanese, owned and operated by the Chinese Government.
(6) Shinmintun-Mukden line, 36 miles. Ditto.
(7) Kirin-Changchun line, 79 miles. Ditto.

Besides the above railways, built and projected, there are in Manchuria 280 miles of railways owned by the Chinese Government but financed by British capital, as well as 1,070 miles of Russian-owned railways.

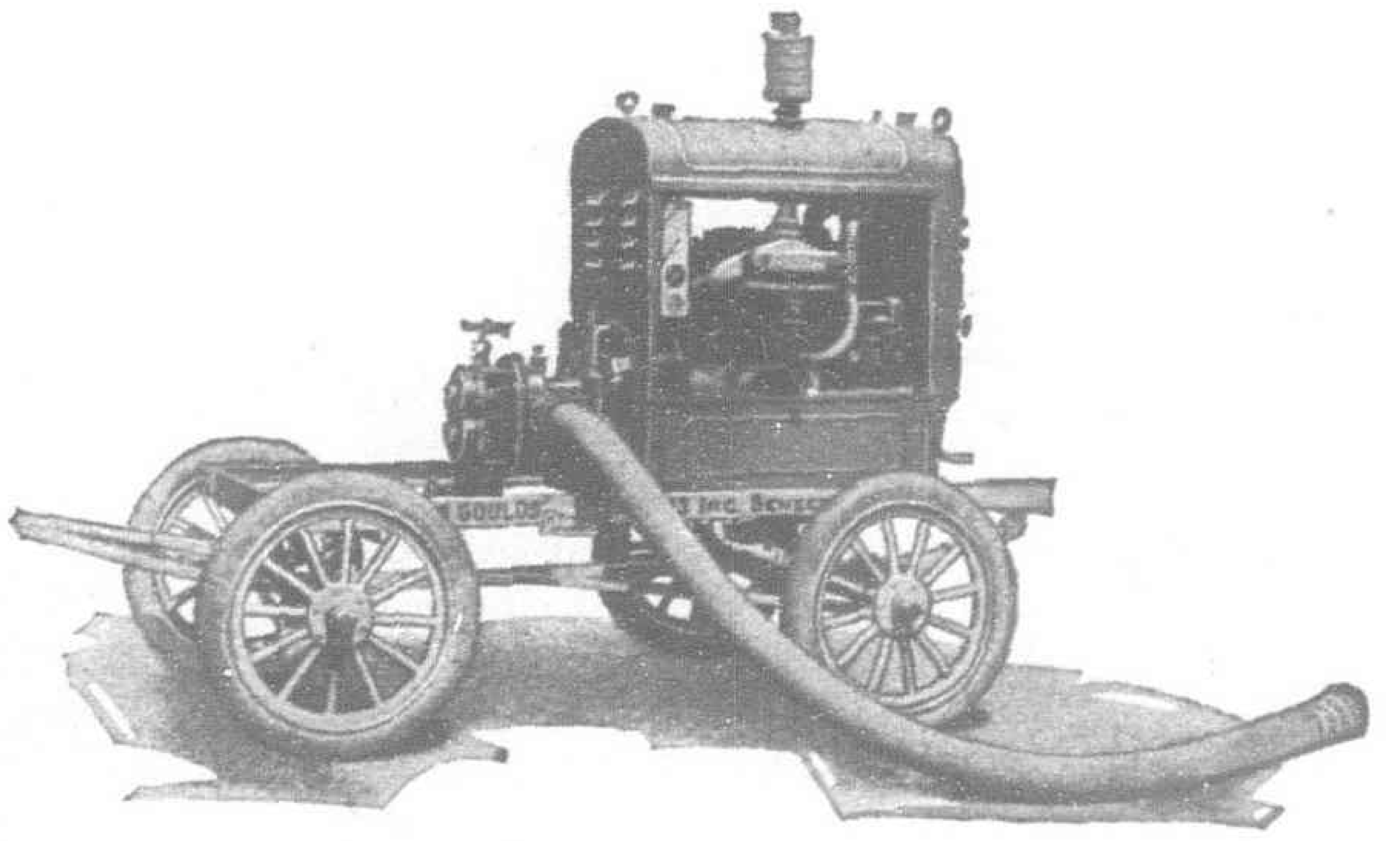
The Morgan loan, if concluded, will be used not for the extension of the existing lines of the South Manchuria System, but for the retirement of some of the 7 per cent. loans now outstanding and for the improvement of the roads and the purchase of American refrigerator cars to be employed to bring meats from Mongolia to the Japanese market.

In its physical aspect the South Manchuria Railway is an American railway, as its rolling stock and other materials are mostly of American origin. Since 1907 the Railway has purchased American materials to the value of more than one hundred million dollars. In addition American machinery and materials worth about $70,000,000 have been imported by other Japanese business houses in Manchuria. Throughout the instrumentality of the railway Manchuria has achieved a phenomenal economic progress. As a result the port of Dairen, built by the Japanese, has become the second largest commercial port of China, preceded only by Shanghai. Through this port the products of Manchuria are exported to all parts of the world, but principally to Japan, whose growing population relies more and more upon food supplies and minerals obtained from Manchuria. But the greatest beneficiaries of this development are, of course, the Chinese themselves. Before the advent of Japanese enterprise the Manchurians, almost entirely farmers, barely eked out an existence by taking in each other's washing, for their products had no market outside of their own sparsely populated territory. Now the same products go to all parts of the world, for the Japanese have opened up vast markets for them. Nor is this all. Hundreds of thousands of Chinese laborers migrate every year from China proper beyond the Great Walls into Manchuria, the new land of promise made possible by Japanese enterprise. They come to Manchuria because the country has been made prosperous through well-managed Japanese railways and well-developed trade facilities, and also because peace and order prevails there under Japan's stabilizing influence, while all other parts of China have been made utterly unlivable by continuous civil wars and factional feuds. One should not be regarded as anti-Chinese because he tells the truth about China. Indeed, he alone is China's friend who is not afraid to speak plainly where China is in the wrong. China can never win the respect of the world if she refuses to listen to the plain talk of her friends.

A New Portable General Service Pump

GOULDS PUMPS, Inc., of Seneca Falls, N. Y., have recently brought out a rotary pumping outfit consisting of a gear type rotary pump close coupled by means of a pin and buffer flexible coupling to a gasoline power unit. The pump and engine are mounted on a four wheel trailer having rubber tires and springs, front and rear. The pump is equipped with relief valve and discharge gate valve which may be threaded to suit various hose coupling threads. The suction is fitted for 4-in suction hose which can be furnished by the purchaser or the manufacturer.

The pump has an iron case and bronze cams. Ball bearings are used throughout. The cams are piloted at either end of the pump with steel pilot gears cut from the solid. The pump is bolted and doweled to the power unit frame by means of an open adapter casting which allows perfect access to the flexible coupling.



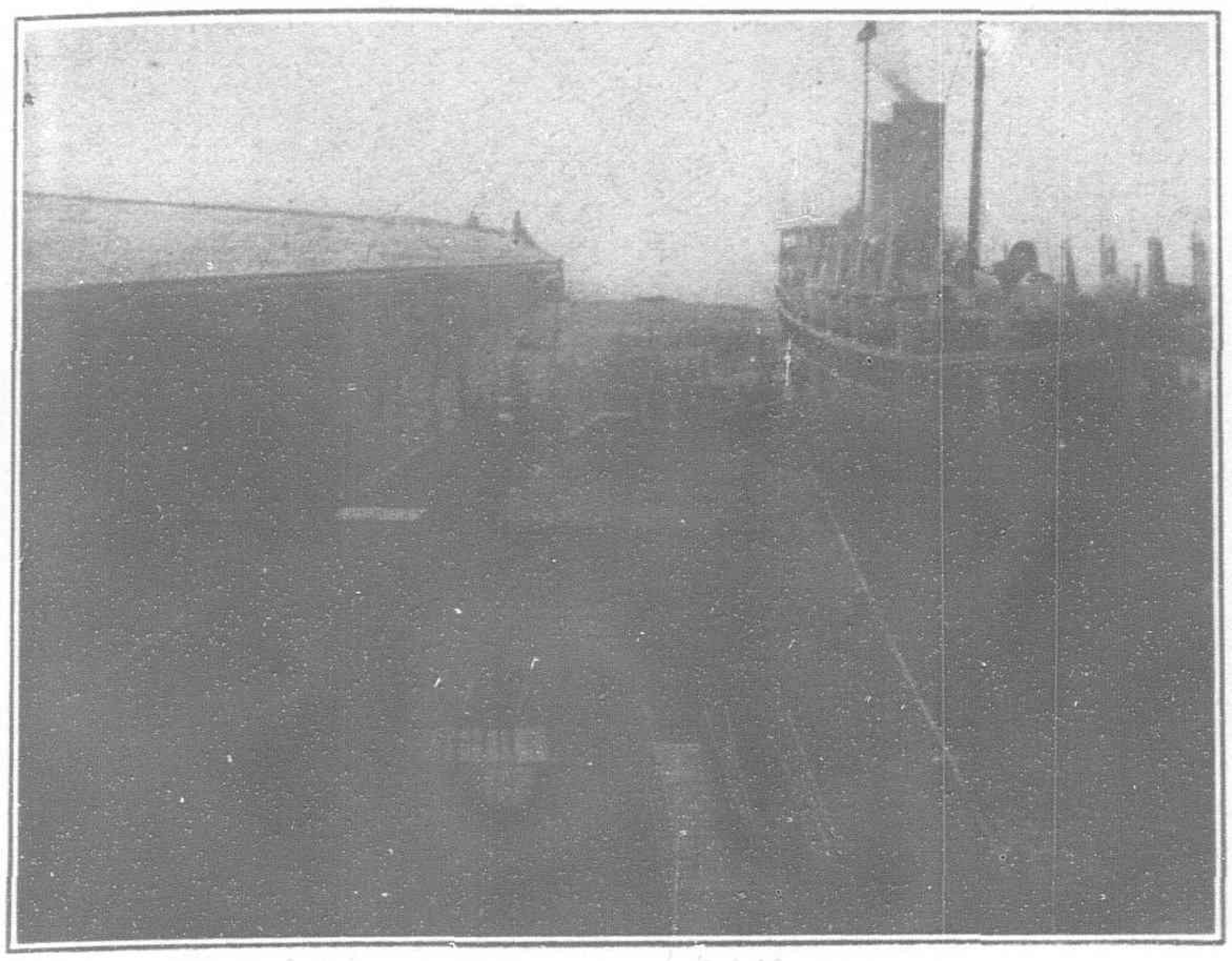
New Goulds Pumps

The engine is a standard self contained, enclosed, industrial power unit with all accessories, ready to run as soon as fuel, oil and water are added.

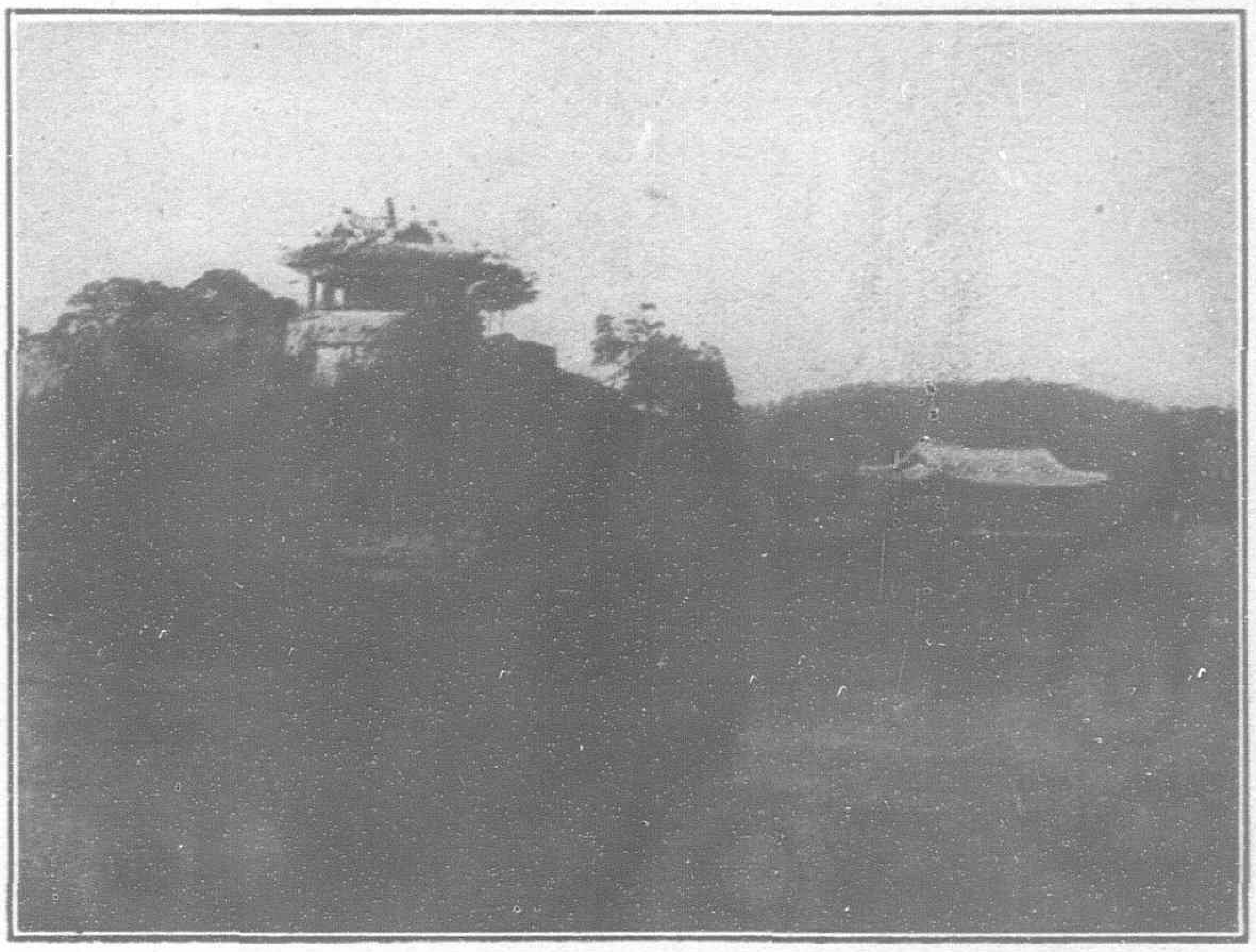
The trailer chassis is a steel frame fitted with springs both front and rear. The wheels are fitted with roller bearings of the completely enclosed type and the tires are of hard rubber.

The outfit will throw a standard 250 GPM fire stream through a $1\frac{1}{8}$-in. standard hose nozzle with a pressure of 100 lbs. per sq. inch at the pump using 100-ft. of $2\frac{1}{2}$-in. hose.

This new unit has been designed for the use of small villages or communities and for industrial plants having no regular fire protection. In addition to fire service the unit is suitable for pumping our cellars or for any general emergency pumping service.



J. G. R. Ferry Boat at Fusan Pier



Kwako-mon, Suigen

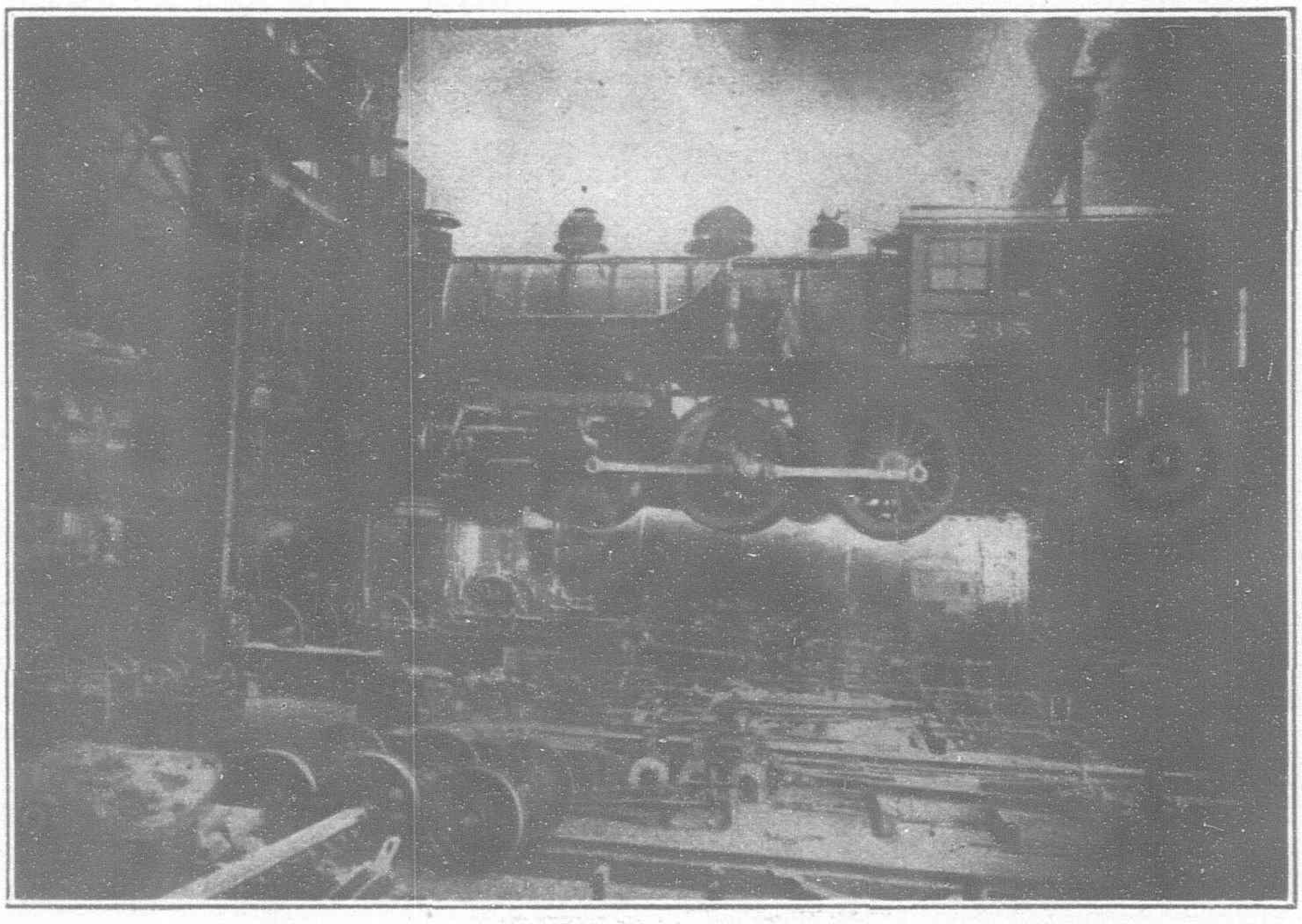
Present Railway Conditions of Korea

By T. Ohmra, Director, Railway Bureau, Government-General of Chosen (Korea)

AFTER a short voyage of eight hours on one of the ferry boats plying between Shimonoseki and Fusan, maintained by the Imperial Japanese Government Railways, we land in the latter port. Fusan is the terminal station of the standard gauge Korean railway which links with the Trans-Continental railways of Asia and Europe and extend to the Atlantic seacoast in Western Europe. Thus, the international railway service starts from Fusan and covers the distance of 8,000 miles to London in 14 days. The sea route, around the Indian Ocean, requires nearly 50 days. So it takes only one-fourth of the time to reach the main city of Europe by rail—starting from the south end of the Korean peninsula.

This main line from Fusan passes through the length of the peninsula and reaches Antung on the north bank of the Yalu River on the South Manchurian border, covering a distance of approximately 600 miles. On the way, it passes through Keijo, the capital of Korea, wherefrom Jinsen, the second important port of Korea, may be reached by rail within an hour. Now being the season for the export of rice, the wharf of this port is piled up with rice worth millions of yen in value.

Starting out from Jinsen, one may cross the peninsula by rail to Genzan, and thence, travel through the South and North Kankyo provinces and arrive at the Tomon River on the border—a distance of nearly 500 miles. The Kankyo line is open to traffic and the communication over the unfinished section is furnished by means of motor-cars in 1½ hours. When this line is completed in the Fall of 1928, one may travel from Keijo to Kwainei in a day or so. Beyond this point, the light railways makes connection with those of Chientao, East Manchuria, at the Kamisambo station.

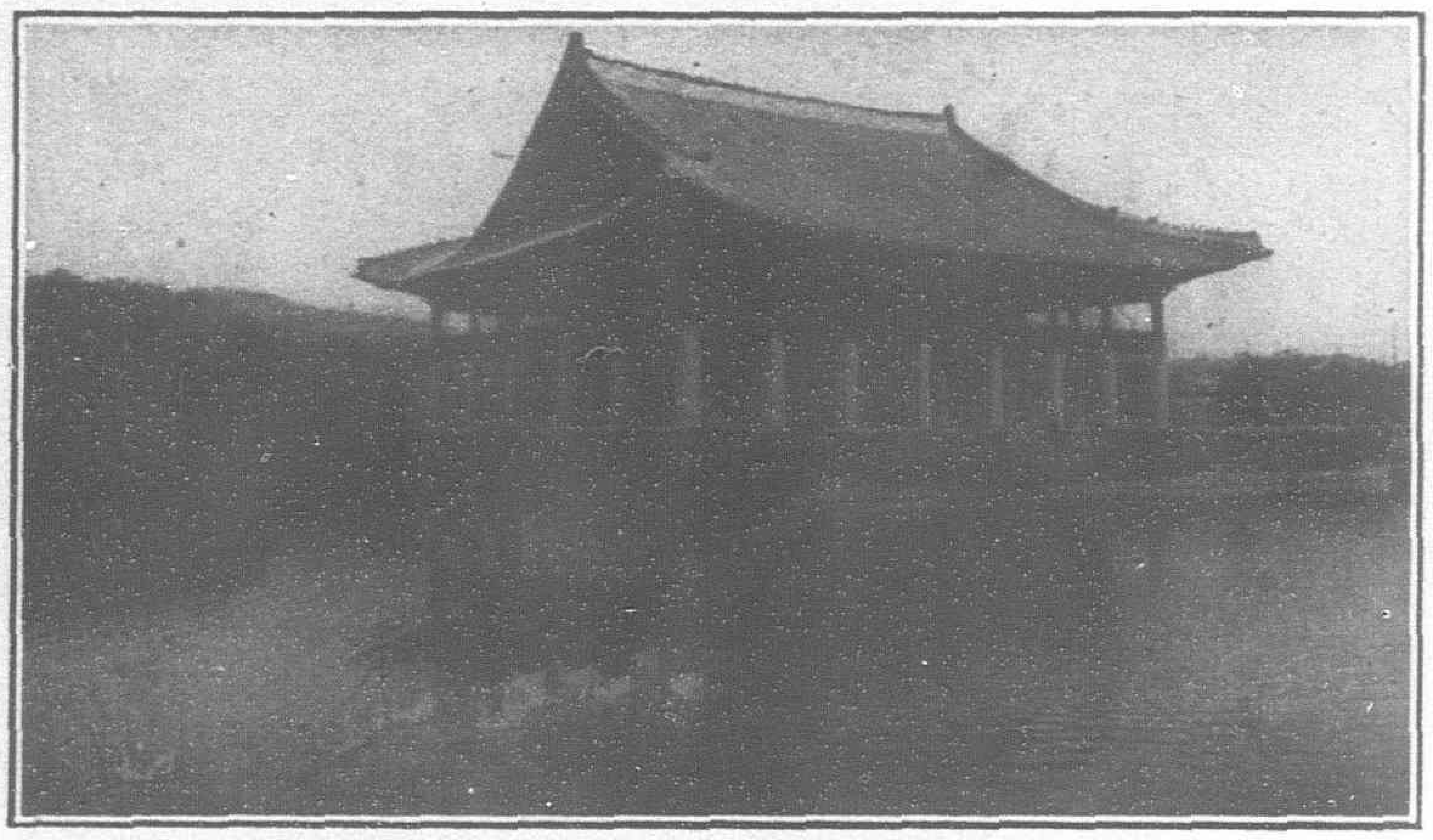


Railway Workshop at Ryuzan

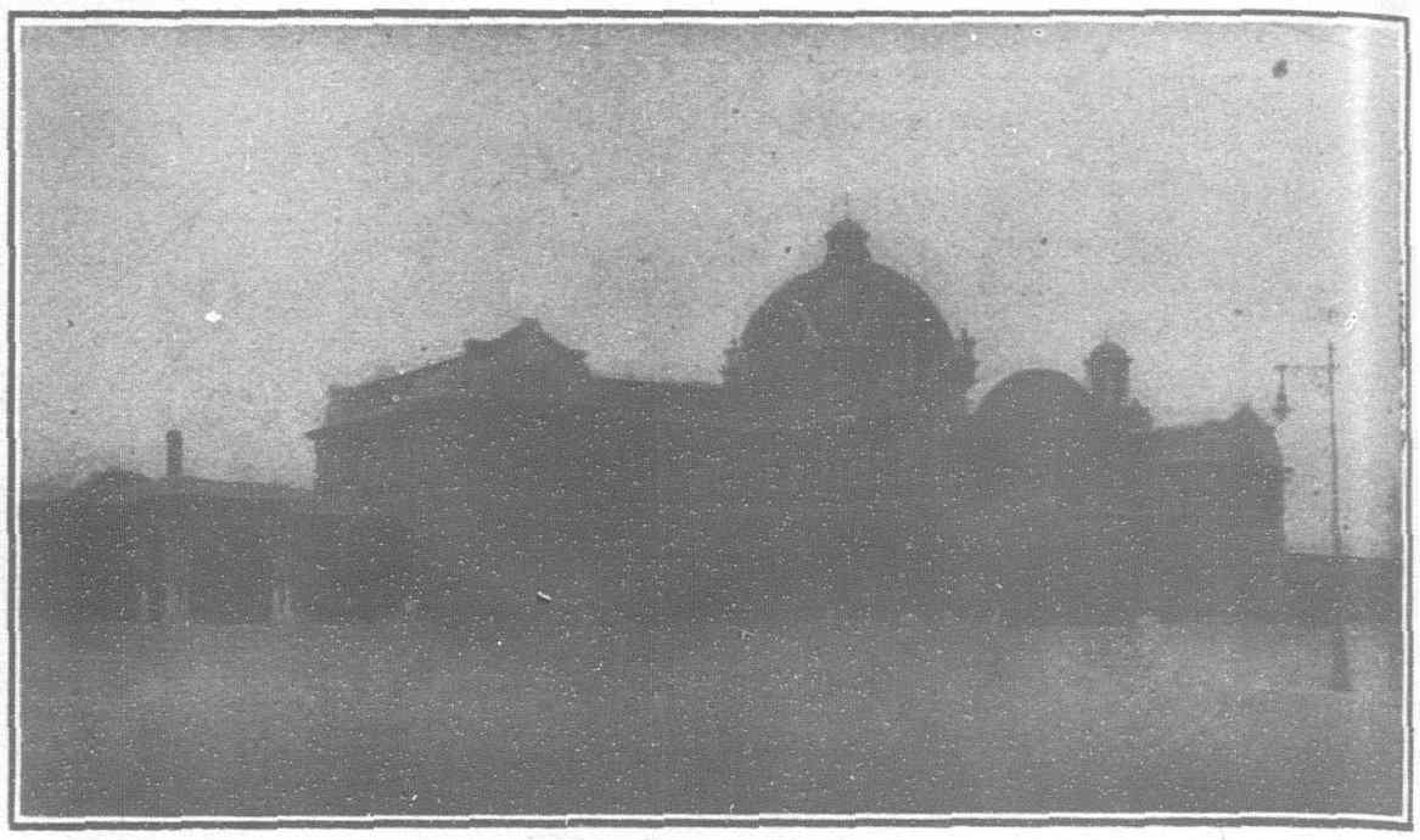
Formerly, there was no railway bridge over the Tomon River, but now that the International Bridge over the river is completed, we have two international bridges connecting Korea and Manchuria ; one at this point, and the other in the Northwest over the Yalu River. These two rivers give Korea a natural border line of 813 miles, separating her from Manchuria and the Soviet Republic. It is about the same length as the distance from Shimonoseki through Tokyo to Utsunomiya.

This border region is in an undeveloped state, except in such districts as Chientao, Shingishu and Antung where the railway communications are available. Modern institutions are lacking on both sides of the border. The virgin forest waits the lumbermans' ax, and the coal, iron and other mineral deposits seek the miner's pick.

The topography of this region is highly favorable for the development of hydro-electric power, and power plants are under construction in one or two places. An example of which is that plant in process of construction under the auspices of the Chosen Hydro-electric Power Company. This work is done by damming up the Fusen River, one of the main feeders of the Yalu, thereby diverting its water to the Josen River flowing into the Sea of Japan. Thus, a head of 3,000 feet of water is to be utilized by the company in generating 150,000 kilowatts of power, and in turn, this power will be used in manufacturing 300,000 tons of ammonium sulphate—the nitrogenous



Keikwai-ro (Banqueting Hall) Keijo



Keijo Station, Keijo

fertilizer. Some 240,000 kilowatts of power will be developed from the Josen River in a similar manner.

The sea washing the northeastern coast of Korea teem with many kinds of fish and is widely known as a better fishery than that of the Hokkaido Island. Now is the season for fishing sardines. Oil is extracted from the sardines and exported mostly to England and to the Homeland markets.

Just as it was stated in the foregoing paragraphs, Northern Korea abounds in natural resources most of which remains undeveloped.

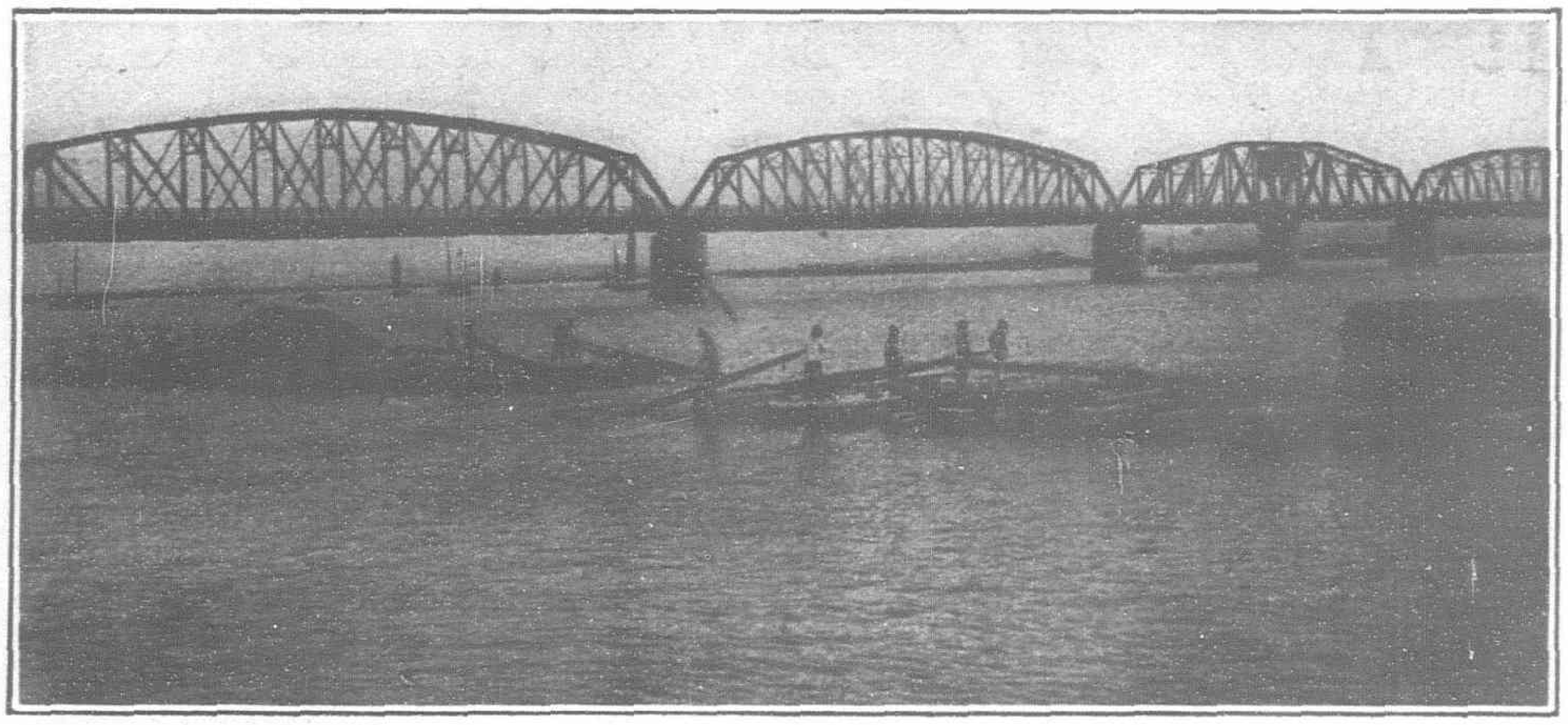
The extension of railways into such districts of economic potentiality is not only for the welfare of the Korean public, but it is also vital to our national existance. The Government, with this view in mind, has decided to build several new lines into the border region.

The first of these new lines begins from the Yuki harbor in North Kankyo, follows along the southern bank of the Tomon River, and after passing through the counties of Keiken and Onjo, it reaches Chientao.

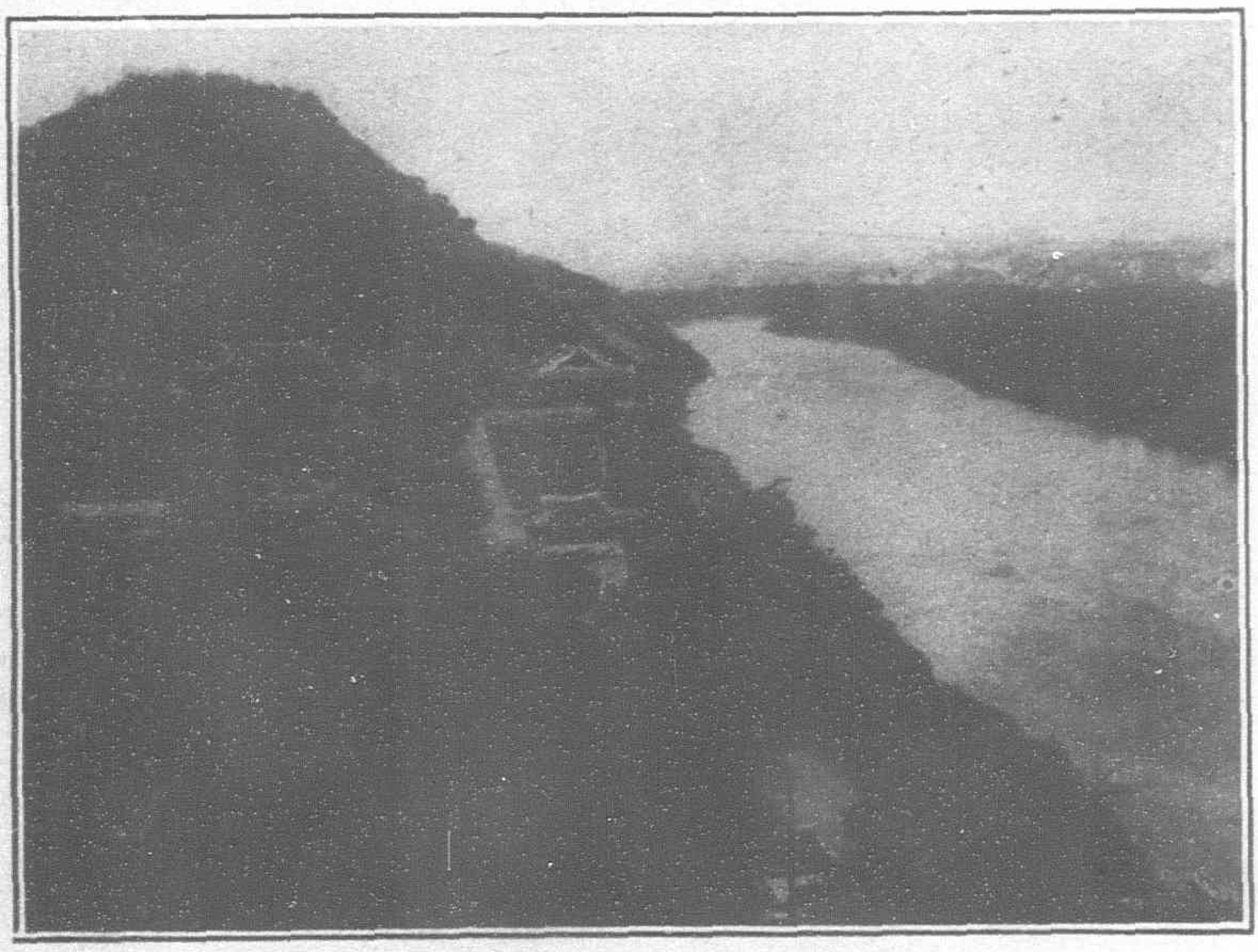
The second line branches off the Kankyo Railway at a point near the port of Joshin, crosses the plateau and reaches the upstream of the Yalu River at Keizanchin opposite the Chinese town of Chohakufu. This line is to serve the rich lumber country.

The third one branches off the Heijo-Genzan Railway at the junction of Junsen and runs almost due north to Mampochin on the south bank of the Yalu River and opposite the historic town of Shuan, which was founded by the Fuyo tribe about 2,000 years ago. This tribe originally came from the Sungari River valley, and migrated southward gradually and settled down in Fuyo. South Chusei Province.

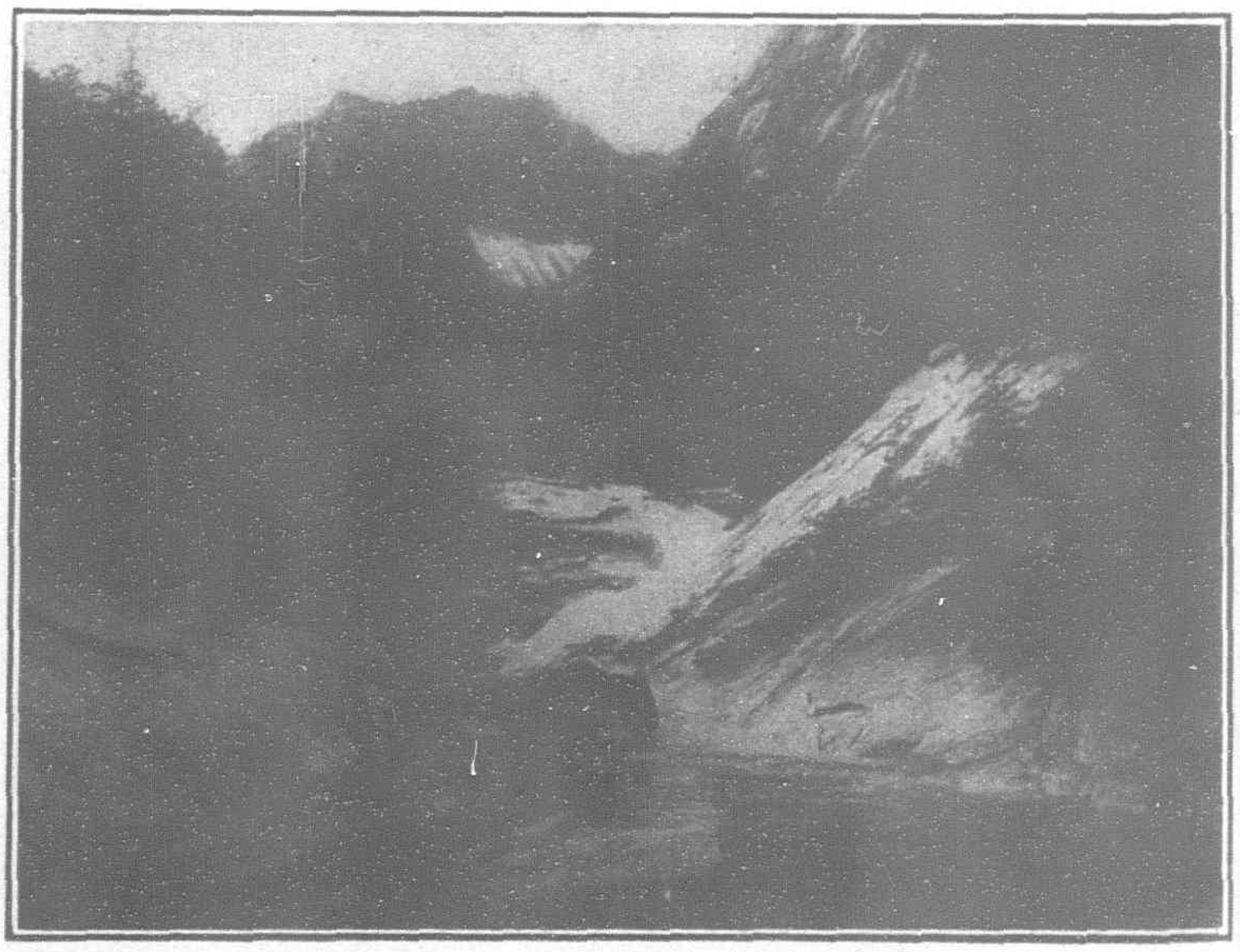
These new railways, besides accelerating the development of the hinterland along the border, have a fair prospect of being connected up with several important railways projected to be constructed in East Manchuria. When all of these new lines are completed, they will form a solid chain of inter-communication between Mongolia, Manchuria and Korea. Thus, the unlimited products of Mongolia and Manchuria will find export outlets through the ports of Yuki, Seishin, Ranan, Joshin in North Kankyo Province, and through Genzan in South Kankyo—all of these ports are on the northeastern coast of Korea and are washed by the Sea of Japan. The movement of goods in this direction will strengthen the steam.



Railway Bridge over the Yalu River

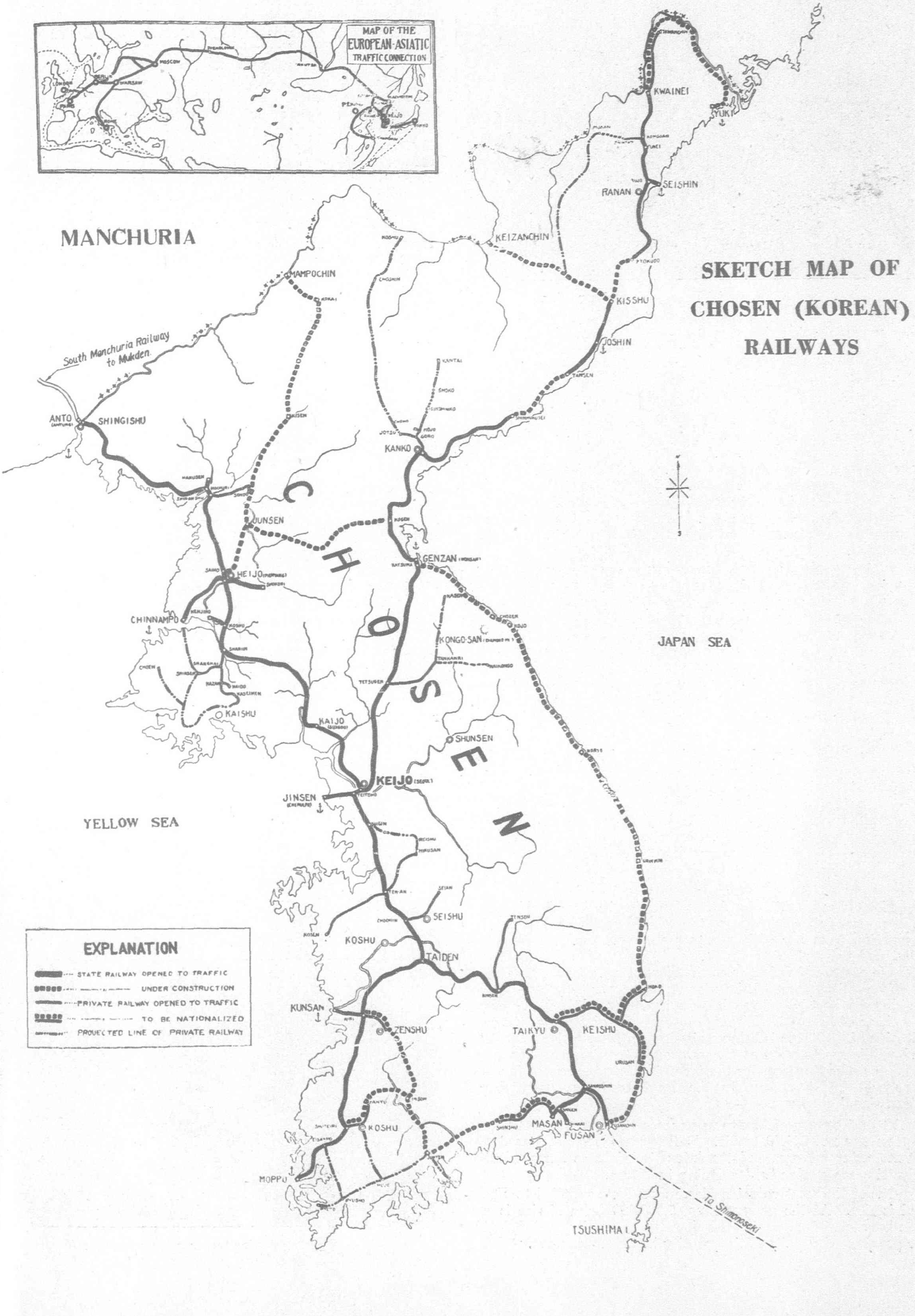


Botan-dai (Peony Point) Heijo



Dancing Phoenix Fall, Inner Kongo San

SKETCH MAP OF CHOSEN (KOREAN) RAILWAYS



Aspect of Myriad Things, Outer Kongo San

ship communications between the ports of Japan and those of the Continent, and economic relations will be greatly enhanced. Some 800 miles of new railways will aid materially in policing the border region, now infested by bandits, and preserve it for the peaceful settlers and for the advancement of civilization.

Besides the railways already mentioned, the East Coast Railway of 390 miles connecting Genzan and Fusan, and lines connecting the latter port to Kunsan and Moppo will also be built. By the way, Kunsan is the foremost port in exporting rice, and Moppo is the most important one in cotton trade. The East Coast Railway will help to develope the detached districts of Kogendo and in that, it will form an unbroken chain of traffic along the east coast of Korea—from Fusan to Kwainei and extend to Kirin Province of Manchuria.

At the present time, the railway mileage of Korea in proportion to her area is less than one half of that of the Hokkaido Island; that is, Korea has an area more than twice that of Hokkaido. Moreover, Korea being a peninsula, possesses some 800 miles of border line, beyond which lie a tremendous area of Manchurian hinterland capable of producing all kinds of raw materials which require the shortest and quickest outlet to the world markets. Then, too, Manchuria is the future market for the manufactured goods of Korea and Japan, and as such, the want of transportation facilities between these countries is now more keenly felt than ever before.

Poor distribution of railway in Korea is on account of the shortness of her railway history. The first railway in Japan, between Tokyo and Yokohama, was completed in the fifth year of Meiji or 55 years ago, whereas the first railway in Korea, between Seoul and Chemulpo, was opened to traffic in the thirty second year of Meijo or only 27 years ago. So that, the railways of Korea are in youthful age, whereas the railways of our Homeland have reached the old age. The railways of Korea are bound to acquire greater development with the advancement in years.

Not only the railways, but all the institutions in Korea are in the youthful state. Then, too, old Korea herself is now rejuvenating from her old state to a modern country. Homeland folks used to speak of the baldness of Korean mountains. Barren hills are disappearing fast from the Korean landscape. As a result of afforestation, most of the mountains appear as refreshing and vivid as the short-haired youth to-day. Old age of the Kan Dynasty is a thing of the past. Through the arteries of railways, the constitution of old Korea is being revitalized with education, industries, and public works. When the railway extensions are completed, the detached villages under the present, miserable economic conditions will be lifted up to the level of inter-provincial and international economy.

The railways would serve no purpose without sufficient volume of passenger and freight traffic. Railway traffic has increased with the mounting mileage, and the future is bright as the productive industries are gradually developing in Korea.

One of the most valuable Korean products supplied to Homeland is rice. At the present time, 5,000,000 koku of rice is sent from here to various markets of Homeland annually, and there is a fair prospect of doubling this quantity in the near future.

The climate of Korea is favorable to the cultivation of cotton, and the annual production of it amounts to some 500,000,000 kin.

Some 50,000 heads of Korean cattle are shipped to various parts of Homeland through the ports of Fusan, Kunsan, Jinsen, Chinnampo, Joshin and Genzan. Northern part of Korea is suitable for pasturing sheep, and it is possible for Korea to supply a substantial quantity of wool to the textile factories of Homeland, where the shortage is most keenly felt.

Korea has tremendous deposits of anthracite and brown coal. Estimated quantity of coal deposits throughout the peninsula amounts to something like 1,100,000,000 tons. Brown coal contains some 15 per cent. of mineral oil, and this fact may, some day, lend a valuable aid in the direction of solving the oil problem of our country.

Regarding metals, Korea is well known as a gold producing country. Among other useful minerals produced in commercial quantities are iron, zinc, lead and barium sulphate. Some of these minerals are rather scarce in our Homeland.

Korea with her hydroelectric power, ample reserve of cheap labor, efficient railway service, and harbor improvements is bound to be a profitable field for judicious investment of capital in the farming, fishing, mining, and manufacturing industries.

In addition to the economic considerations, Korea is also an ideal land to live in. She is blessed with healthy climate, magnificent sceneries; such as the world-famous Kongo San (Diamond Mts.), and the social amenities, and the educational facilities are not lacking. There is even an imperial university in Keijo.

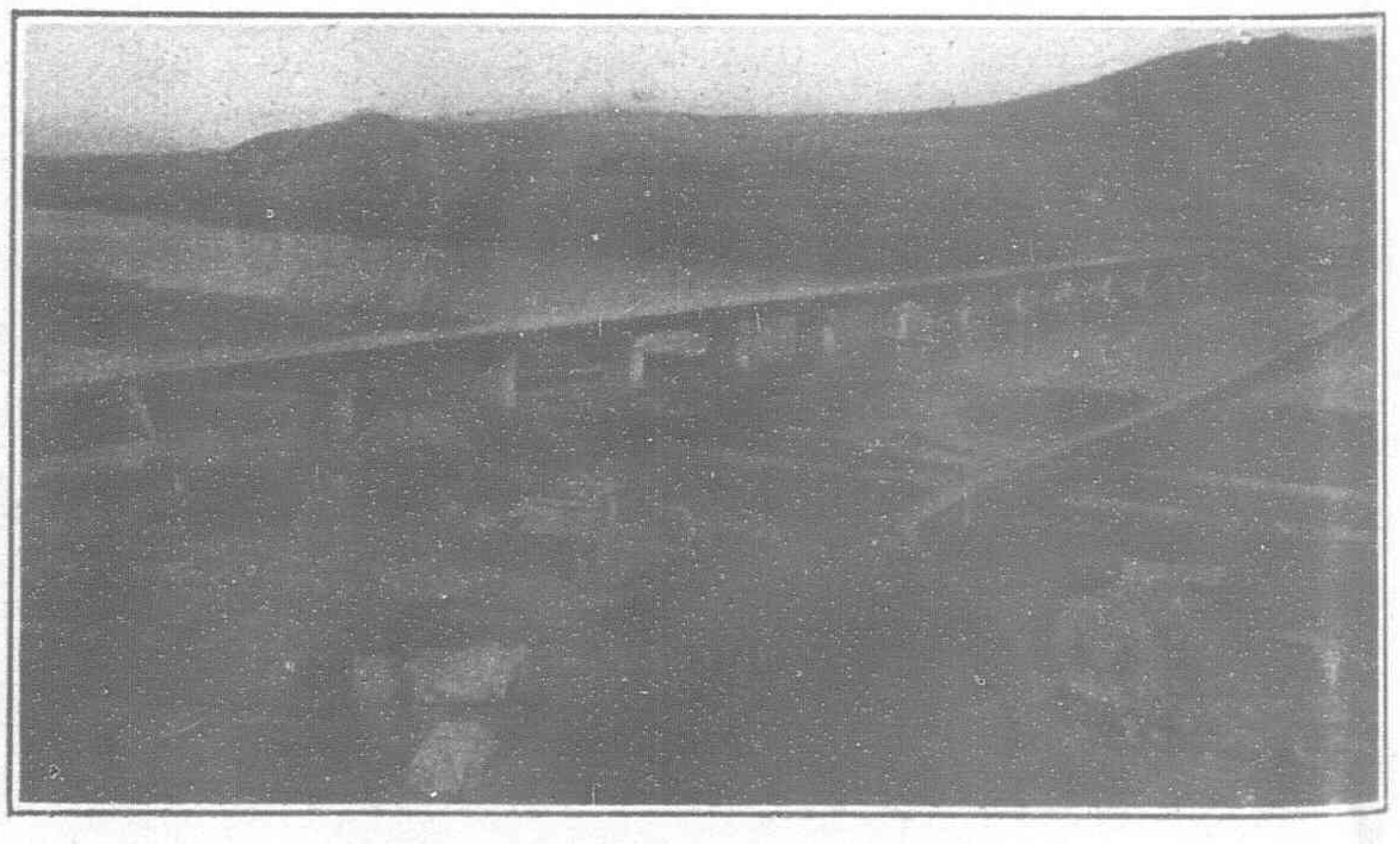
The extension of railways into the isolated districts will quicken the development of natural resources of this country, and this in turn will give stimulus to the Korean life—commercial, social, and political.

The present railway mileage open to traffic, including that of the private lines, is a little less than 2,000 miles. The officials and employees serving these railways number nearly 14,000 for the state railways, and 3,000 for the private lines, respectively. Approximately one half of 17,000 railway men is Korean and the other half of that number is Japanese, and these peoples are co-operating in their daily work. For example; a locomotive may be run by a Korean engineer and a Japaneee fireman or *vice versa*, and a station may be managed by a Korean station master and assisted by a Japanese assistant and a mixed station crew or *vice versa*. Korean and Japanese conductors guide the train movements. Majority of the hands in the railway workshops are Koreans and are co-operating with the Japanese workmen in the work of repairing and building railway cars and locomotives. There are Korean officials and engineers working side by side with the Japanese in the central office.

The Railway School of Ryuzan is educating and training many young Koreans for various branches of the railway service, and is sending out from 60 to 70 young men into actual service every year.

The Railway Bureau of the Government-General of Chosen is not only devoting time and money to the extension and improvement of the railways, but is also fostering the spirit of co-operation among the Japanese and Korean employees.

Thus, the Chosen Government Railways, besides furnishing efficient transportation service to the public at large, are affording useful training and practical experience to many Korean young men.



Railway Bridge over the Tomon River

Japan Looks in on the Philippines

With a Clear-out Policy of Non-Aggressive Colonixing

By H. F. Wilkins

THE Land of the Rising Sun has about 10,000 of her subjects living, working and prospering in America's Asiatic outpost, the Philippine Islands. Less hampered by immigration restrictions than in the United States Japanese are able to come to the Philippines in larger numbers. The number of Japanese immigrants to the Philippines is carefully regulated by the Japanese themselves.

The matter as explained by Mr. Eishiro Nuida, Japanese Consul-General in Manila, is simply one of discrimination. Emigrants from the homeland are neither encouraged nor allowed to go to foreign countries where they are unwelcome. They are welcomed in the Philippines, and they are coming in all the time. But at a very modest rate of immigration, only about 150 or 200 a year.

"The first consideration," says Mr. Nuida, "is whether our nationals are welcome. This is relatively easy to determine. It is also highly important to let in only so many as will prosper in business. This is not so easy to determine."

The only way to determine it is carefully to watch markets, agricultural conditions, price fluctuations and economic factors in the Philippines, and to keep the government authorities at home constantly informed as to conditions. This is what Mr. Nuida does. His recommendations are constantly available in Tokyo as a guide for letting out emigrants. So is the influx regulated.

Eishiro Nuida, Japanese Consul-General at Manila

Filipino-Japanese Trade

An account of the methods of Japanese colongizing in the Philippines and the reasons thereof is timely just now in view of a recent advance in trade relations between the two countries.

These trade relations are of course primely important. Furtherance of commercial interests is the main reason for any government's interest in its citizens of other lands. Any ship-owing government admits this when not confronted with a need for tactful and stately sentimental verbiage. The politest man in history once admitted it in so many words. Sir Walter Raleigh proclaimed that the nation controlling the trade of the world controls the world itself.

There is no reason for Japan to obscure her purpose in watching with an eagle eye her colonization in the Philippines. These Japanese colonists, a large proportion of them, are either producing goods that figure in Japanese trade with the Islands, or are directly or indirectly connected with that trade in some manner. Many of them are shippers, bankers, importers and exporters, or plantation owners and workers.

Japan, as a nation, is foremost in the Orient in realizing the possibilities of the Philippines as a tropical land of promise. The figures show it, particularly the recent ones. Japan is now in second place among all nations in volume of trade with the Philippines. The United States of course is first, controlling about 70 per cent. of the total trade. This is natural on account of the free trade act. Japan in the last few years has been running about third, sometimes fourth. Great Britain has always been second to the United States. But now Japan and the United Kingdom have changed places.

In 1926, Japan was in third place with 7.39 per cent. of total trade. Her imports in monetary value amounted to 23,227,086 *pesos* and her exports 14,618,522, making a total of 37,845,608 *pesos*.

A Sudden Advance

The most recent available figures show that in the month of December, 1927, the total foreign trade of the Philippines was 50,410,000 *pesos*. Of this total, Japan had 6 per cent., with a total of 3,430,000 *pesos'* worth. Goods shipped from Japan to the Philippines were nearly double in volume those going the other way. The percentage was lower than the yearly total of 1926, owing to increased trade with America. But Japan went to first place among all other nations trading with Philippines.

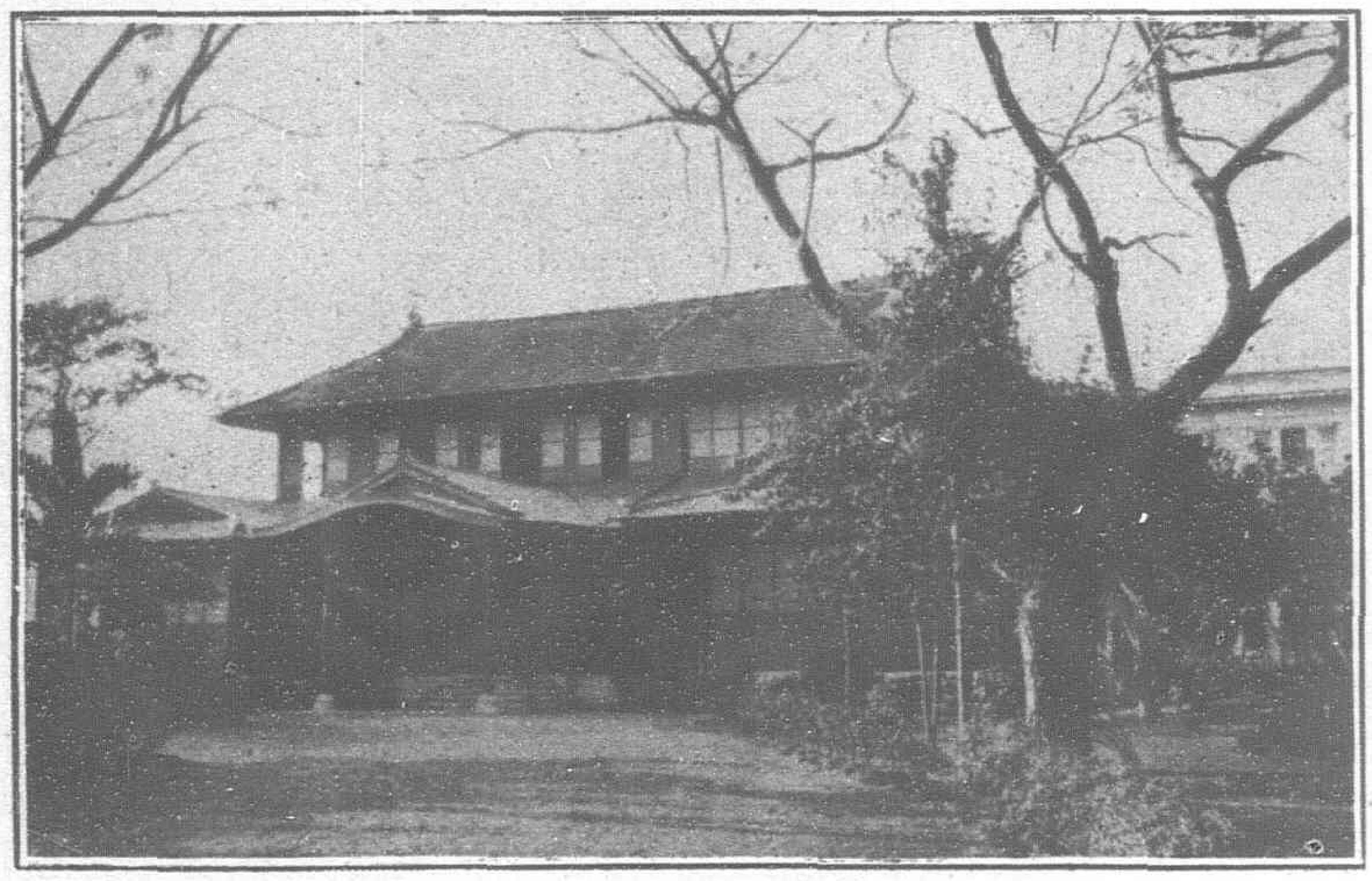
Japan has had relations of some sort with the Philippines since about the middle of the sixteenth century. Early relations are largely a bloody tale of Christian persecution and execution. Quite a contrast with relations as they exist to-day.

For years after Spain first discovered the island of Luzon, Japanese mariners regarded it as a sort of no man's land. They fought with the Spaniards before they had any traffic with the friendly brown natives. The first encounter took place after a Spanish galley one day fired on a Japanese vessel. They hooked sterns and had a bloody fight somewhere off the north coast of Luzon. The Spaniards won.

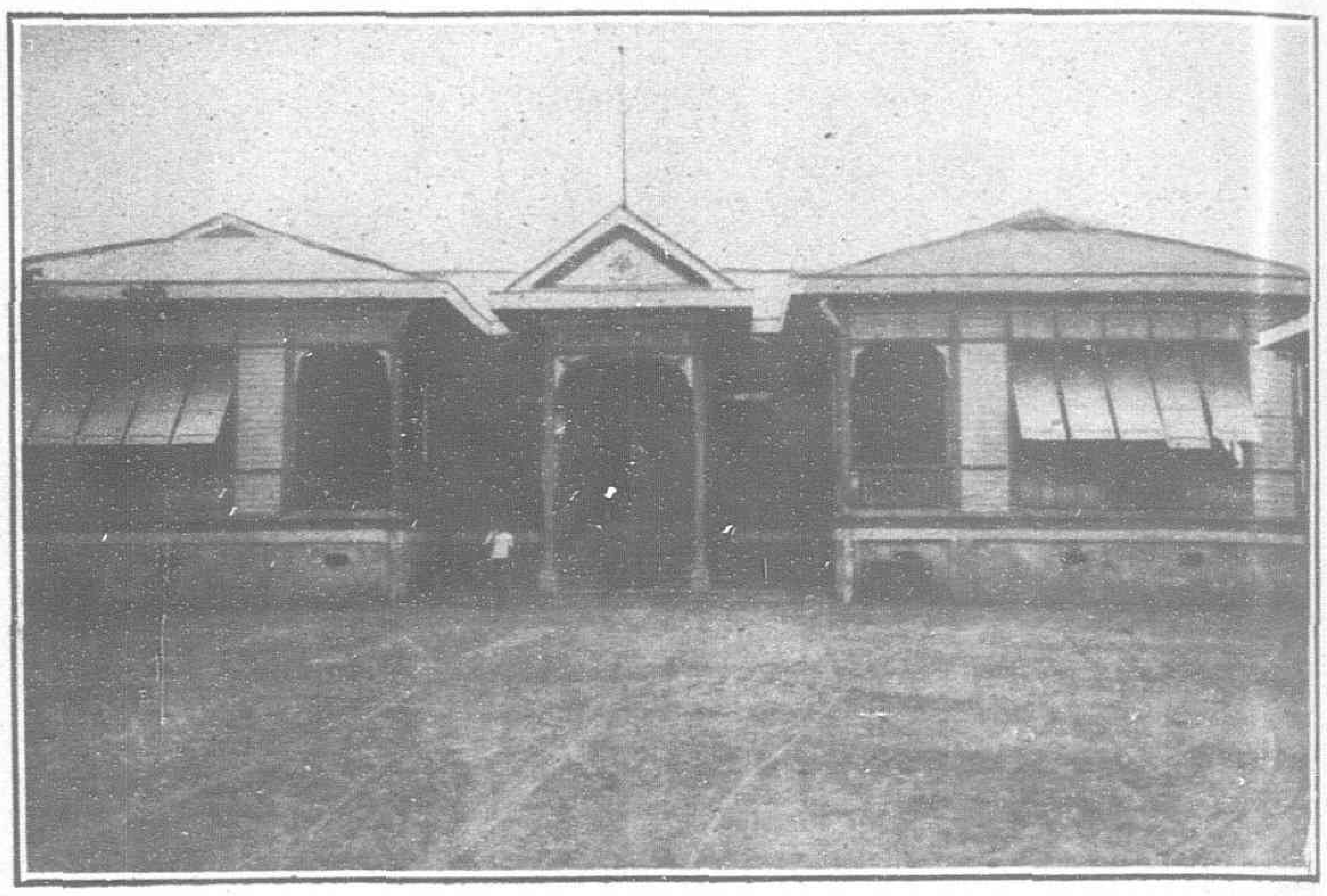
Some time later the Spaniards entered the Rio Grande de Cagayan and found a Japanese fleet there. They passed peacefully and gained the shore, even had time to dig trenches and mount cannon before the Japanese attacked. They swarmed ashore and pulled the cannon down by hanging onto the mouths of them. But the Spaniards stuck, greased their guns to prevent further tractics of this kind, and finally drove what was left of the Japanese out. There seem to have been no more attempted invasions by the Japanese.

A Mission of Peace

Later however, about 1580, they came peacefully to Manila with a view to establishing trade. There was a good deal of political fanfare over it and finally a delegation of Jesuit friars went to



The Japanese Primary School at Manila



The Japan Club, Manila

Tokyo to sign a treaty of commerce. It took them 30 days to make the trip. They negotiated the treaty *all* right, but stayed too long. The friars were looking for more converts. Most of them got their necks broken for stirring up what the Emperor thought was malicious propaganda.

Japanese trade has far outlasted Spanish rule in the Islands, under the auspices of which it had its start. Steadily it has grown, bringing with it the inevitable drift of population. The census of 1918 reported, 6,684 Japanese in the Islands, and since that time they have increased their number by about 3,500.

The Japanese are engaged in many different trades and industries in the Philippines, but like the immigrants of any other nation they have specialized and concentrated. They have chosen their field and made their mark in one of the basic industries, the growing and marketing of abaca, or the so-called Manila hemp.

Japanese As Abaca Planters

Consequently the most important colony of Japanese is at the port of Davao, on the southern coast of the island of Mindanao. This region has the most favorable conditions for growing high-grade abaca, and more of it is produced and exported here than from any other point in the islands. There are far more Japanese settled here than live in the city of Manila. They own plantations, run them, develop them, and in many cases set precedents for successful cultivation.

Davao is called the " youngest " province in the Philippines. Its history is recent and scant and is rather in the making and in the future. Little was known of the district before about 1823, when Bagobos inhabited the coasts. There is still a rather large area of territory in the mountainous region surrounding the fertile coast line which has never been explored. Mount Apo, the highest in the island group, is located not far from the city of Davao.

Moro priates were the first invaders of this peaceful tropical island. They drove the Bagobos back into the hills, and the conquered warriors sent emissaries overland to the Spanish military post at Cagayan for help. As a result the Spaniards sent a sea expedition to Davao, hosited the Spanish flag and drove out the Moros. Davao was occupied by the American army in 1900, and it is since that time that the abaca industry has been developed on a commercial scale.

The abaca plant contains a fiber which has high tensile strength, the most important quality of all fibers. Abaca fiber ranges well above 37,000 grams per gram-meter. It is used for making binder twine, cordage and high grade rope. Rope used at sea for instance, by firemen, by persons engaged in work requiring scaffolds high above the ground is abaca rope of the best quality. The role played by abaca in the industrial world makes it difficult for any fiber to take its place. Under the supervision and direction of the government's Bureau of Agriculture, Davao planters are cultivating productive varieties of abaca containing the strongest fiber. Growth of plants bearing fiber that tests less than 45,000 grams per gram-meter is discouraged.

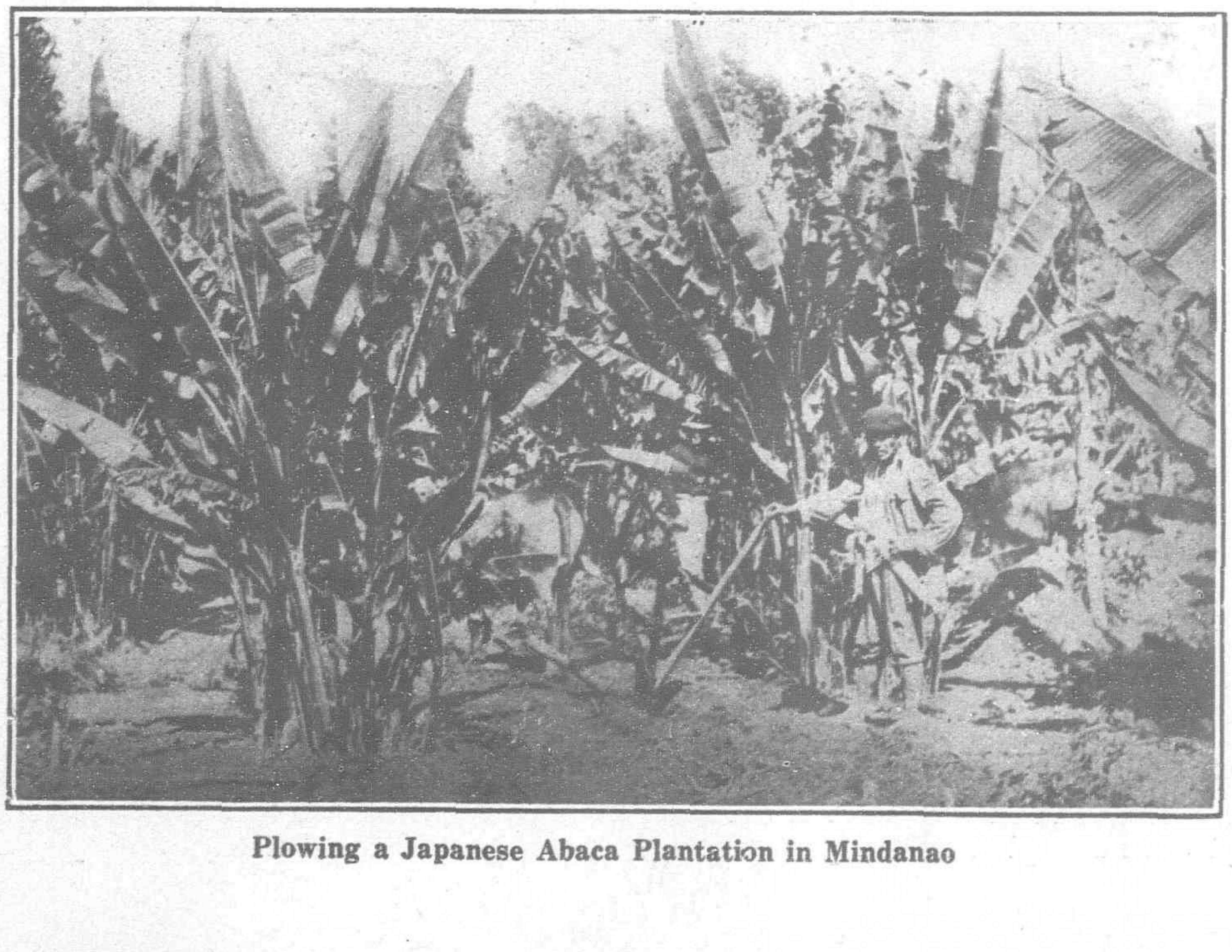
Development in Davao

The census of 1918 showed that almost all the arable land of Davao province was in the hands of Japanese corporations, producing mostly abaca fiber and some copra. The rapid progress of agricultural development in Davao is made impressive by the fact that whereas in 1917 there were 69 corporations engaged in agriculture on a fairly large scale, that number grew to 127 in a year's time. Of these, 82 were organized by Japanese, 20 by Americans and 19 by Filipinos.

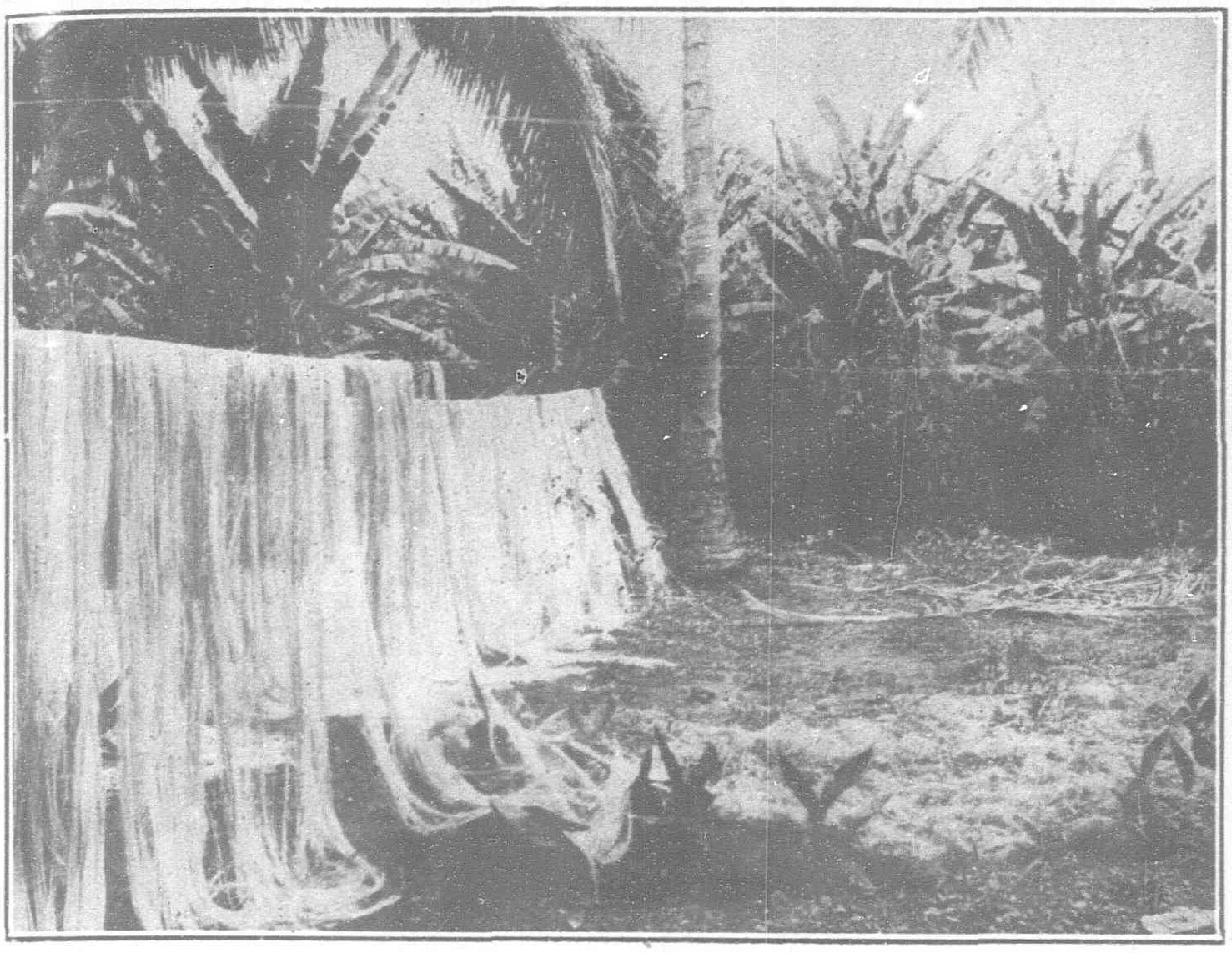
Latest available reports estimate the capital invested in Davao province by the Japanese alone at 8,000,000 to 10,000,000 *pesos.*

A Japanese corporation called the Ohta Development Company operates the largest plantations, and they are exceptionally well organized and managed. These are located at Talomo and Mintal. In the latter place, the company has installed an irrigation system including three miles of main canals and 70 miles of laterals. Talomo is the company's administration center, and it maintains here a private wharf and large bodegas.

A large, airy modern hospital has been erected in Mintal, and all buildings are lighted with electricity from a small hydro electric plant, where ice also is manufactured for the needs of the various surrounding plantations.



Plowing a Japanese Abaca Plantation in Mindanao



Drying Abaca Fibre Stripped by Japanese Workers

Speaking of the abaca industry in Davao, and with special reference to Japanese owned and managed plantations, the Bureau of Agriculture once made the formal statement that "altogether, considering the area, its general appointment and management and the excellent condition of the planatations, this enterprise reflects the greatest credit on its organizers and administrators and is well worth investigating by prospective planters who wish to see a model abaca and coconut plantation managed in line with the most advanced ideas in tropical agriculture."

Port and Harbor Works

Development of the port of Davao and port facilities in nearby towns along the bay has been made necessary by the advance of the abaca industry and the increase in population and export. This year the Bureau of Public Works is building a concrete pier at Davao as an extension to the present wooden wharf. A contract was awarded in 1926 for construction of 59.6 linear meters of such pier, 9.3 meters wide. Work on the pier progressed slowly in 1927 owing to the fact that the concrete piles had to be spliced, in some cases twice, in order to obtain the required bearing. On December 31, 1927, the entire number of piles had been driven, spliced and redriven to bearing, and 14 linear meters of deck slab had been cast.

It is proposed to start replacement of the present wooden wharf with a concrete structure from funds appropriated in the 1926 budget.

At Santa Ana, in the same province, work is progressing on a reinforced concrete wharf. The project comprises in addition to 49-meter approach section of concrete, a main wharf built in an L section 68 meters long by 12.3 meters wide.

When present construction is completed, the port of Davao will be equipped to berth and handle deep-water shipping close by the center of the town itself, readily available to shore transportation facilities, cutting down considerably the cost of stevedoring and lessening the time required for turning vessels around. Japanese advancement of the abaca planting industry in Mindanao is held in great measure responsible for the growth of the port of Davao, youngest in the islands, to a place ranking alongside the largest secondary ports in the Philippines.

The Fishing Industry

Fishing is another industry in which the Japanese figure as largely as any other nationality outside the Filipinos themselves. There is a large amount of pearl fishing in the islands, and Philippine pearls are classed very favorably on world jewel markets. Hundreds of Japanese fishing boats anchor nightly in Manila Bay and by day ply the waters of the China Sea off the coast of Luzon. In southern ports and on equatorial coasts too, there are many Japanese fishing vessels.

Mr. Nuida, the Japanese Consul-General, recently called attention to the possibilities for development of the fishing industry as a unit in the Philippines. There are tremendous undeveloped resources in Philippine waters that have not been tapped excepting in a sporadic way. Fish is a large item in the diet of natives in the southern islands, yet they import a tremendous amount of canned fish every year. The possibility of establishing canning factories near the source of supply can be readily appreciated. It is considered quite possible that if any such development does take place, the Japanese will play a large part in it.

Japanese Life in Manila

In Manila, center of Philippine industrial, commercial, political and social life, the Japanese have established themselves as pleasant, industrious citizens and good solid folk, an asset to the community. This is not an impression, it is the opinion of business men, politicians and residents who have reason to come in contact with them over a period of years.

Japan has contributed bankers, brokers, commercial and industrial men, shopkeepers and laborers, almost every class to the cosmopolitan population of the city. Many of the city's barber shops are Japanese owned. Several large restaurants are run and owned by Japanese. Japanese residents have their own club in Manila, a beautifully kept building near Pasay, on the city's southern boundary.

It is interesting to note that the Japanese are educating their own children in Manila. The Japanese Association of Manila was organized in August, 1925, mainly for the purpose of establishing the Japanese Primary School on Calle M. Ponce, in the Sampaloc district. The association has 1,200 members who contribute annually to a common fund for maintaining the school. The Japanese Free School is a corporation organized for directly administering funds and affairs incident to giving Japanese children the same kind of education as would be available to them at home. The school has at present a registration of 108 boys and 90 girls. It costs about 2,000 *pesos*. a month to run it.

Trade, Business and Profession

Wholesale and retail distribution of products imported to the Philippines from Japan is largely in the hands of Japanese businessmen. An idea of the multiple trades in which Manila Japanese are engaged may be had from a brief survey of the chief products imported from the Land of the Rising Sun.

Cotton piece goods is the largest single item of import. This comes in the form of articles of clothing adapted to the uses of foreigners, natives, and of course the Japanese themselves. Much coal is sent down from Japan, most of it for the coaling station at Cavite, across the bay from Manila. Japanese coal of a good grade is available at two or three *pesos* per ton cheaper than Australian coal.

Glass, earthenware, enamel and porcelain fixtures and art goods are largely imported. Japan sends down a good deal of rich silk. Toys are brought from Japan, and matches. Brassware, both for industrial purposes and for decorative adornment, is a large item of import. Tradesmen small and big are making a good living through the distribution of products from their own home land.

On the whole, the Japanese policy of colonizing in the Philippines is regarded locally as a wise plan, well conceived and well administered. Japanese immigrants have proved themselves capable of being welcomed as important factors in growth of the Philippine Islands as a tropical land of promise. It is the often expressed hope and belief of Consul-General Nuida that his countrymen in the Philippines are mutually benefitting themselves, the country of their residence, and their own country back home.

And by wisely controlling the influx of Japanese both in quality and quantity to the Philippines, the Japanese government is pursuing a surprisingly sane policy. A less far-sighted government, stimulated by rancour at the exclusion policy of the United States in her home territory, might have gone at the problem differently and with less favorable results.

Boring for Water in the Philippines

By H. F. Wilkins

THE Insular government of the Philippine Islands has solved successfully the universal problem of the Orient, the quest for an ample supply of pure water. Subterranean sources can furnish a capacity flow of 73,279 gallons per minute of uncontaminated simon-pure water through artesian wells built by the government. These government wells, drilled by the Bureau of Public Works, number 1,956, and it is estimated that in addition there are about 540 successful artesian wells drilled privately, using government equipment.

Consequently the Philippine Islands are well ahead of any other Oriental country in the matter of boring for water. China's fresh water problem is just as bad if not worse than it was in the Philippines in 1898, when the American forces took control and the area and population is of course vastly greater. The British Municipal Council in Tientsin has done some excellent work in well drilling. The whole British Concession soon will be supplied entirely with artesian well water. Several wells have been drilled in Shanghai and elsewhere along the coast. But with the exception of a few localities, China has not yet reached even the experimental stage in tapping her subterranean resources for pure water.

The work done by the Bureau of Public Works in the Philippines may have some value in China and elsewhere as a precedent. The government has spent 5,393,797 *pesos* in drilling wells in the islands, including both successful and unsuccessful ones, and they have not spent 24 years in the work without learning something about it.

The Land of Unboiled Water

Immediately after the occupation of Manila by the American forces in 1898, the securing of a potable water supply became a very serious problem. All kinds of sickness were prevalent, and their unchecked spread was in many cases directly traceable to contaminated public sources of water. Cholera was rampant. Bubonic plague, small-pox and malaria were common as sunshine, to say nothing of typhoid fever.

Manila at that time boasted the only water-works system in the entire Philippines, and the water furnished by this system was far from potable. With the exception of one flowing well at the Manila and Dagupan railway station at San Fernando, Pampanga, 61 kilometers north of Manila, no other flowing wells were known to be in existence. The only water to be had was taken from rivers, streams, dug or open wells, and was used for all purposes without being boiled.

After due study the Philippine government decided that the best and quickest way to secure potable water was to drill artesian wells, provided of course that underground water could be found. The Philippine Commission took a chance on that risk and appropriated a small sum of money with which a drilling machine and proper tools and equipment were purchased and brought in from America.

In December, 1904, the first well was completed on Engineer Island, near Fort Santiago at the mouth of the Pasig River, in the city of Manila. This well was drilled to a depth of 582 feet and it cost 4,855 *pesos* to drill. The jubilation that took place when the well " came through " with a decent flow was a small scale duplication of scenes in the Texas panhandle when a gusher comes through in the oil fields. The Engineer Island well flowed two gallons of water a minute and pumped 28 gallons. It meant health instead of riches, that was the only difference. Its importance to people affected was certainly no less.

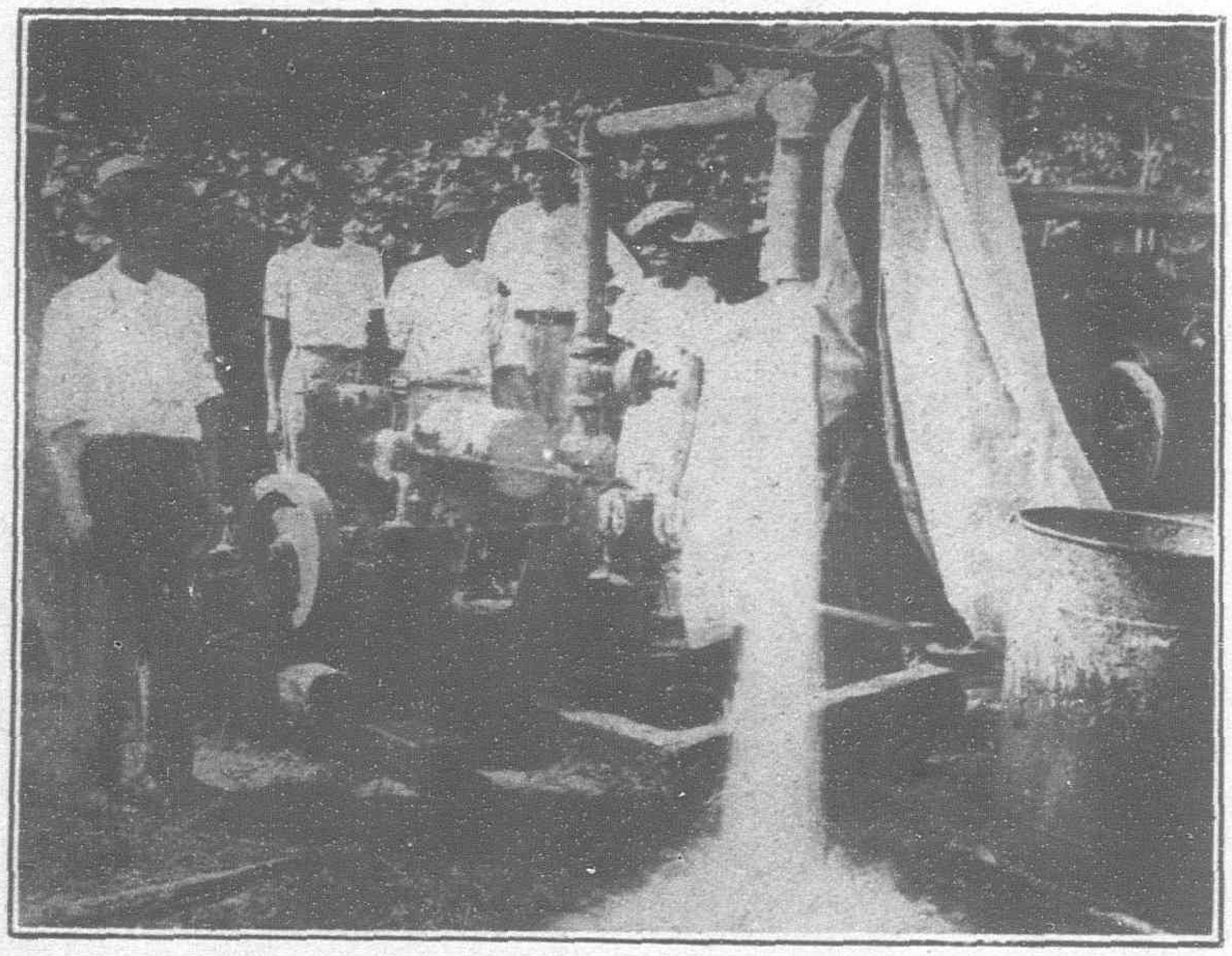
Pioneer Setbacks

The success of this first well was a leverage with which to pry more money out of appropriations for continuing the good work. Larger money concessions were made, machines and equipment were purchased, and the work went ahead slowly but surely.

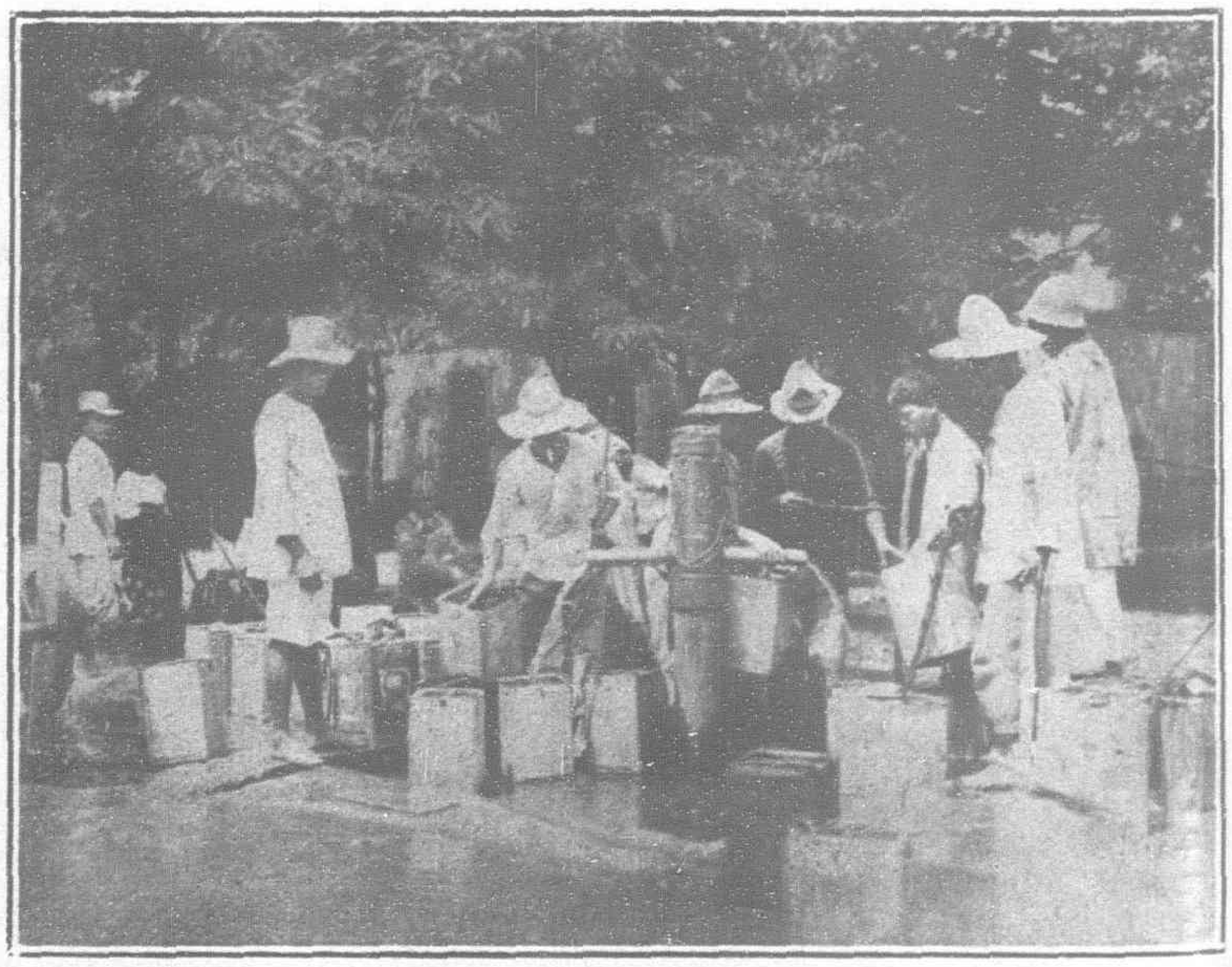
In the early stages of operation each drilling crew was composed of two Americans, the driller and assistant driller, and five Filipino laborers. The work of course was largely experimental, and in each new locality the first well was usually drilled to a depth of 700 to 2,500 feet in attempts to secure flowing wells. A tremendous amount of labor and time was spent on this deep drilling.

Pioneer work in well drilling in the Philippines had all the hazards of a Panama Canal project, so far as health was concerned. American engineers who took charge of the work braved real dangers, none the less real because they were invisible. All kinds of sickness prevailed, as has been stated before. The Filipinos who worked with them were even less susceptible than those to whom the climate was an unaccustomed thing.

There were few doctors, very few. There were no drug stores and no hospitals outside a few of the larger towns such as Manila, Cebu, Iloilo and Panay. Communication was so poor that a man taken sick on the job had little chance for assistance other than simple first aid remedies. Each well driller was furnished with a box of simple remedies and he had to make the most of them, both for himself when the need arose and for his crew when they took



Testing the Flow at the Paranaque Artesian Well, Rizal Province, one of the Motor Driven Type



One Better than the Old Town Pump. A Flowing Artesian Well at Calaocan, Rizal Province

sick. His medical library consisted of a small pamphlet containing instructions for the use of what little first aid equipment was furnished.

The water coming from drilled wells being so much purer, it tasted far different from what the natives had been accustomed to dipping from rivers, streams and shallow wells for so many years. Consequently these early well drillers had to carry on a campaign of education after their efforts at drilling were completed and they had produced a flow. There were few doctors to advise the people.

But the natives finally did learn that the new water brought a decrease in the rate of mortality and they became very enthusiastic and particular about using it. To-day the demand for artesian wells is so great that in all probability the Insular government will have to extend its activities still farther by making larger appropriations and using more equipment.

The Army Takes it up

Soon after 1904 when the Philippine government started drilling artesian wells, the United States Military Department stationed in the Philippines started to drill wells on some of its reservations. Drills were set down at Camp Stotsenburg in Pampanga province, at Fort McKinley and Camp Nichols in Rizal province, at the Sternberg General Hospital, Quartel de Espana and the Quartermaster Department in Manila, and in camps at Cebu, Tacloban, Guimaras, Zamboanga, Corregidor Island, Carabao Island, Fraile Island and other places.

Whether all these plants were successful is not known.

A number of wells have been drilled by private contractors who entered the well drilling business later on. O. A. Leary, Frank L. Irwin and William Irwin & Shoemaker are still in the business of drilling wells in the Philippines. Frank L. Irwin, by the way, was the first superintendent of the Artesian Wells Division of the Bureau of Public Works.

F. W. McCaw, a man of wide experience in successful well drilling operations, is the present incumbent of that office.

"It is safe to state," says McCaw, "that there are to-day about 2,500 successful wells throughout the Philippines, of which number 1,956 have been drilled by the Philippine government."

A Tabular Account

The figure quoted by McCaw as to the number of wells drilled by the government includes those drilled since the first of this year. The following tabular statement prepared by the Artesian Wells Division shows accurately the development of the well drilling business in the Philippines since 1904:

TABLE SHOWING THE NUMBER OF GOVERNMENT-DRILLED ARTESIAN WELLS IN THE PHILIPPINES AS OF DECEMBER 31, 1927

Years	No. of successful wells	Total No. of Feet	Capacity in gal. per min.	Total Cost of successful wells	No. of unsuccessful wells	Total No. of Feet	Total Cost of unsuccessful wells	Total No. of wells drilled	Total Cost
				P.			P.		P.
(*a*) 1904	1	582	28	4,855.13	—	—	—	1	4,855.13
1905	1	606	78	3,381.14	1	800	7,498.61	2	10,879.75
1906	10	1,440	459	15,605.98	1	600	5,498.13	11	21,104.11
1907	8	1,991	374	17,059.69	0	0	—	8	17,059.69
1908	8	3,429	1,038	24,933.65	2	600	16,217.05	10	41,150.70
1909	14	7,417	1,080	87,722.08	5	1,000	23,638.00	19	111,360.00
1910	16	8,650	777	75,479.60	8	1,500	47,089.18	24	122,568.78
1911	27	16,722	2,981	87,550.48	8	1,500	40,012.82	35	127,563.30
1912	62	30,798	2,883	143,078.73	12	3,000	35,250.08	74	178,328.81
1913	92	46,271	3,660	372,205.96	14	3,600	55,467.56	106	427,673.52
(*b*) 1914	55	26,137	1,887	174,656.87	5	1,200	16,094.98	60	190,751.85
(*c*) 1914	103	39,200	4,164	218,267.03	17	10,500	66,312.45	120	284,579.48
1915	140	51,302	5,094	248,568.57	15	4,700	26,631.77	155	275,200.34
1916	122	53,148	4,214	199,058.80	13	3,800	35,646.64	135	234,705.44
1917	108	33,670	2,913	161,519.42	9	2,000	20,273.40	117	181,792.82
1918	165	48,632	5,835	274,936.79	14	4,000	59,278.25	179	334,215.04
1919	163	44.998	4,207	334,959.96	13	2,900	27,383.41	176	372,343.37
1920	148	49,520	5,583	432,013.18	17	7,513	35,331.68	165	467,344.86
(*d*) 1921	125	38,203	4,437	325,034.14	9	4,645	28,358.13	134	353,392.27
(*d*) 1922	98	32,594	3,318	336,563.81	15	3,922	49,789.45	113	386,353.26
(*d*) 1923	65	16,907	1,740	145,818.82	12	1.764	24,182.11	77	170,000.93
(*e*) 1924	104	27,504	3,613	224,320.69	17	4,259	37,695.07	121	262,015.76
(*e*) 1925	104	27,641	3,524	245,336.22	20	8,835	67,124.24	124	312,460.46
1926	81	21,181	2,496	143,716.28	17	9.917	57,435.90	98	201,152.18
(*e*) 1927	124	37,217	3,896	296,291.63	4	2,011	8,654.36	128	304,945.99
Total	1,944	655,760	73,279	4,602,934.65	248	84,564	790,863.27	2,194	5,393,797.92

NOTE.—(*a*) Fiscal year.
(*b*) First half of calendar year covering the period from July 1, 1913, to December 31, 1913.
(*c*) Calendar year
(*d*) Not including private wells drilled by the B.P.W.
(*e*) No private wells were drilled by the Bureau during the year.

Present Operation

With the exception of the island of Mindanao, very little hard rock and almost no boulders are encountered by well drilling rigs in any of the Philippine Islands. The average substrata are composed of clay, soft shale, adobe rock and sand.

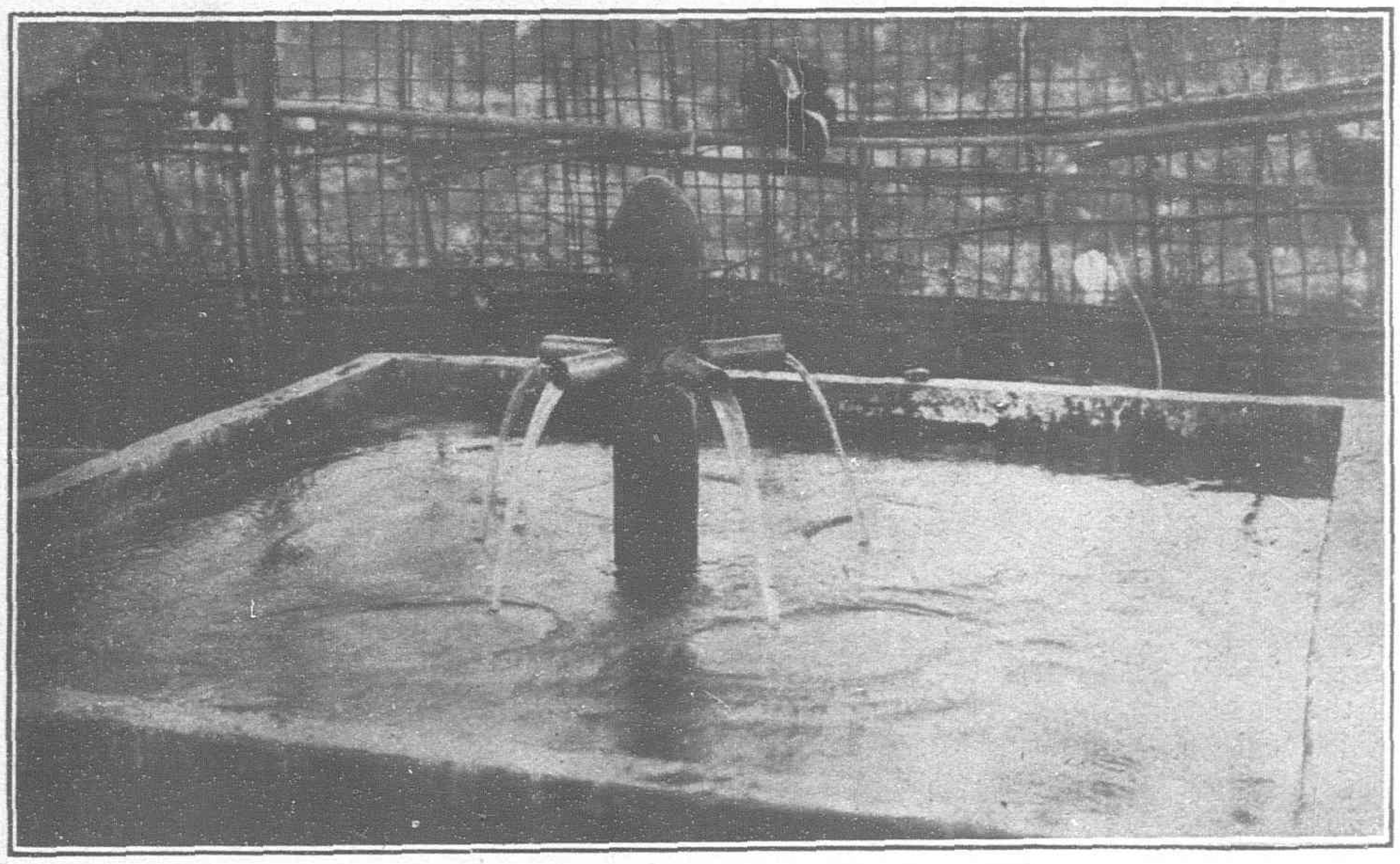
Maintenance of all public wells is under the direct supervision of district engineers, who are Insular employees under the control of the Bureau of Public Works. This arrangement follows out executive orders drafted in the office of the Governor-General. By this system, wells and well pumps are maintained in a proper and efficient manner which insures a steady flow of good pure water at all times, regardless of peak demands. These district engineers are also sanitary engineers of their respective districts, and they have jurisdiction over all private wells insofar as their sanitary condition is concerned.

While the majority of wells are of the pumping type, still in almost every province where wells have been drilled there are several of the flowing type. In the provinces of Bulacan, Nueva Ecija, Pangasinan, Pampanga and Tarlac on the central plain of the island of Luzon, almost all wells are of the flowing type.

The 1,956 wells that have been drilled by the Philippine government are capable of supplying a total of 46,114,420 gallons of water per 12-hour day, which at the rate of 20 gallons per capita would supply 2,305,721 people, or about a third of the population of the Philippines.

Treating the Water

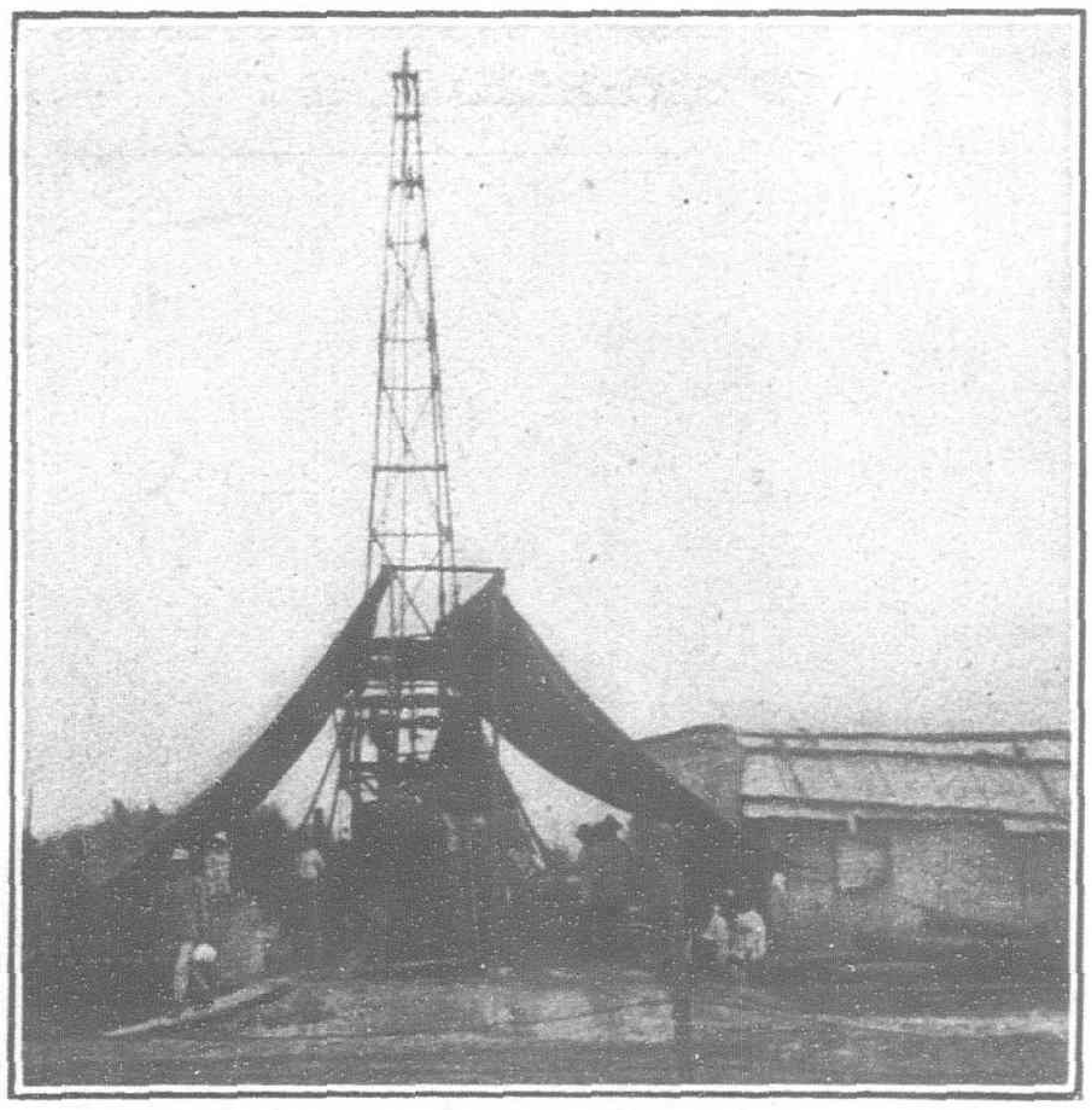
When a well has been drilled to a depth where water is encountered believed by the well driller to be sufficiently pure for use, the well is then treated with either a strong solution of chloride of lime



Bustos Artesian Well, Bulacan Province, P.I.

or permanganate of potassium, after which a sample of the water is collected in a sterilized bottle and forwarded to the Bureau of Science at Manila to be analysed.

If the Bureau of Science declares it safe for domestic purposes, the well is then put in shape to be used, but if the water is found not potable, the well is either drilled down until the next stratum of water is encountered or else all the pipe is pulled out and the well abandoned. Existing circumstances and indications dictate what shall be done, and the decision is usually left to the engineer in charge of the well drilling.



A Columbia Deep Well Rig Working at San Ildefonso, Bulacan

Most of these well drillers have been in the last few years Filipinos, recruited from the ranks of the most promising assistants. As fast as these Filipino laborers become proficient in the work they are promoted to drillers and placed in charge of the drilling machines. At present all machines owned by the Insular government are in charge of Filipinos, according to McCaw, and their services are proving very satisfactory.

Gauging Necessary Depth

Owing to depressions and upheavals caused by earthquakes and volcanic eruptions of the past, there are many faults in the geological formations of which the Philippine Islands are composed. This necessarily complicates the process of drilling and makes it unusually difficult to determine just how deep to drill.

But practise makes perfect. Since the experimental stage of the first few years after 1904, well drilling has been advanced to what may well be called a thoroughly scientific basis.

With instruments and precedents it is comparatively easy now to anticipate the exact level at which good water is to be had. In all of the coast towns throughout the islands, salt water is passed through before the fresh-water strata are reached. This salt water has to be cased off in such a manner that it will not follow down along the outside of the pipe and mix with the fresh water.

Although some of the early wells went down as far as 2,500 feet in order to establish a flow where pumping would be unnecessary, none are drilled so deep to-day. The average well has to be drilled less than 300 feet, and some of them not much more than 200 feet.

In Recent Years

The last four years has seen a greater growth in the government's business of drilling wells in the Philippines than a good many years previous. In the first six months of 1923 there were on the average only seven deep well rigs in operation, in spite of the fact that during the greater part of this time there were 22 machines in the field. This was owing largely to the fact that the 1923 Insular appropriations were not released until late in April, so that there were no funds available for the purchase and repair of equipment for old machines which had been in operation since 1904. In this year there were completed 84 wells with an aggregate depth of 22,439 feet. Of these, 71 were successful and furnished potable water for 67,000 people. The greatest number of these were in Cebu.

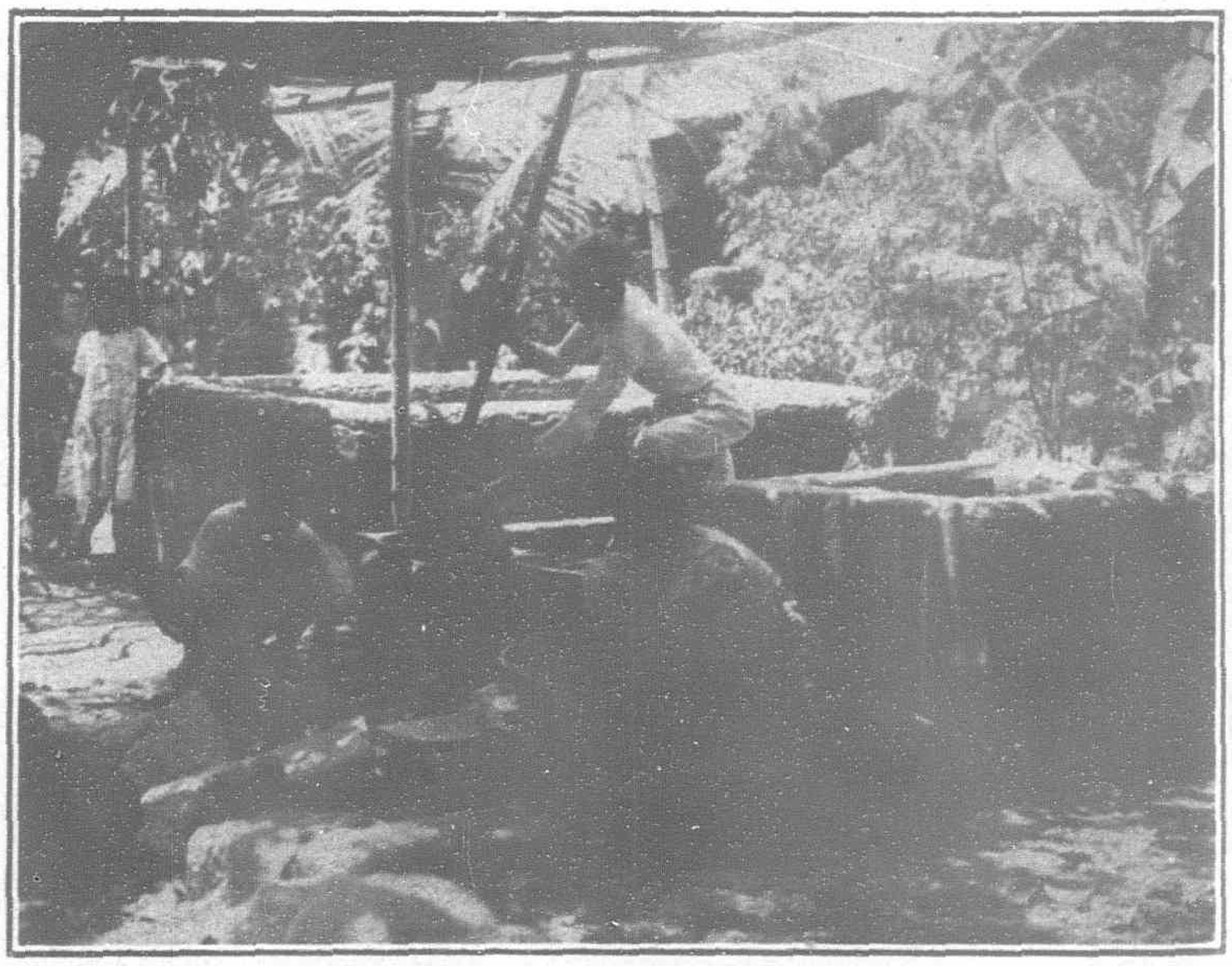
In 1924 there were 19 deep well rigs in active operation, and the work done in that year is correspondingly greater in volume. From that year, on the increase in production continued. A total of 121 wells were drilled in 1924, 104 of them being successful.

In this year, 1924, the former practise of drilling artesian wells for private parties, when equipment was available, was discontinued. All private wells drilled by Bureau of Public Works outfits were rented out for 18 *pesos* a day. Under this arrangement the private party assumed all responsibility as to cost and supervision of drilling operations. Under the new plan, nine wells for private parties were drilled by government machines, one for the Hawaiian-Philippine Sugar Central at Silay, Occidental Negros, one for a hospital in Rizal province, one for the Royal Ice Plant and one for the San Miguel Brewery in Manila. Six were drilled for the Mindoro Sugar Company at San Jose, Mindoro. All but one of the nine were successful.

In the latter part of 1926 even this policy of renting out equipment was discontinued. The government went back to its former policy of drilling wells for private parties, provided the services of a private conductor could not be secured and also provided that a government machine was available for the work.

This method has been found more satisfactory since it enables the bureau to exercise closer supervision

(Continued on page 127).



One of the Old-Type Concrete Wells in the Philippines, a Source of Public Contamination

Land and Food in China

By O. E. Baker, Agricultural Economist, U. S. Department of Agriculture (Before the Institute of Pacific Relations)

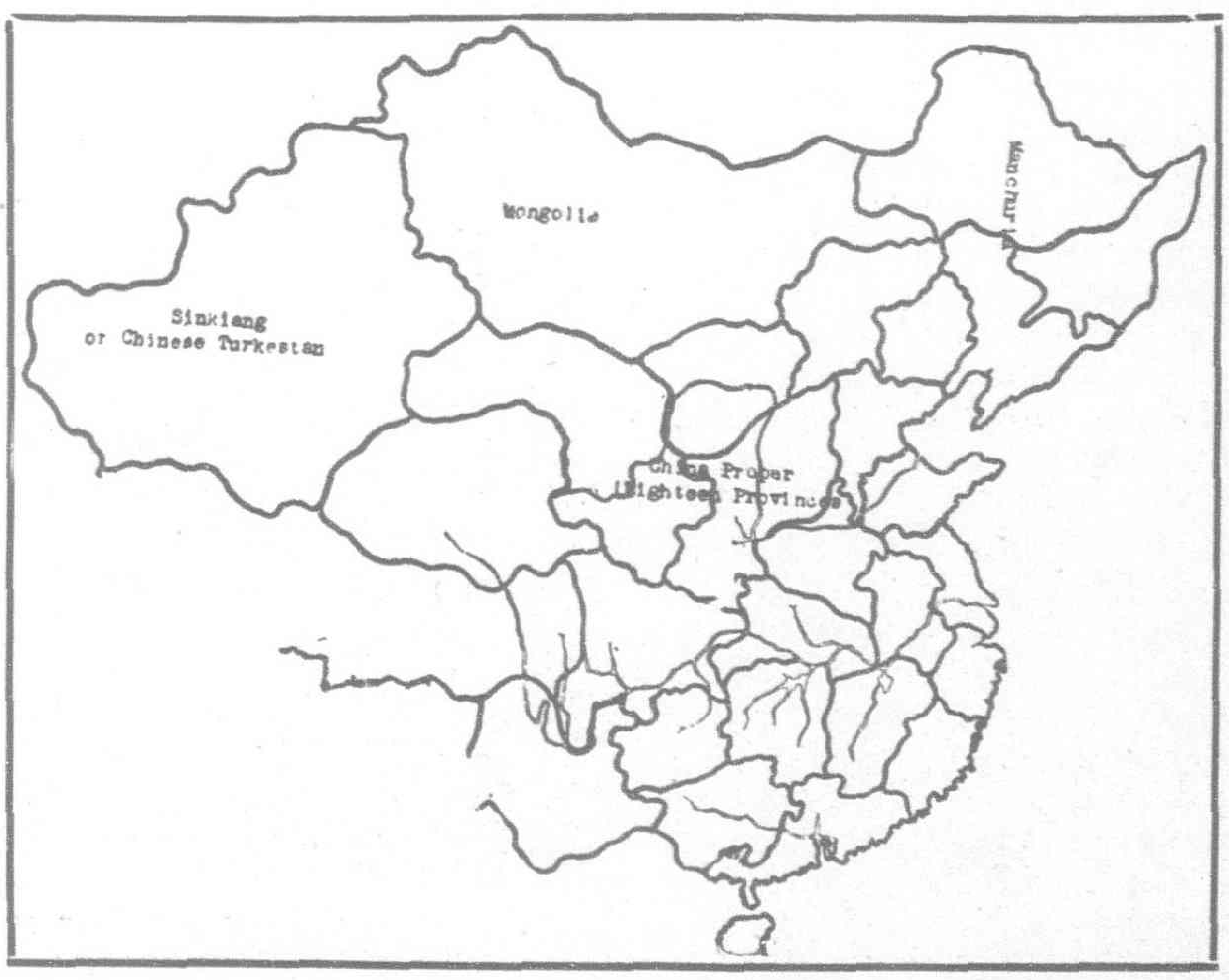
[This Article is reproduced from "The Mid-Pacific," because it is one of the most brilliant presentations of facts prepared in recent years on conditions in China. Professor Baker has not been in China but bases his arguments upon a study of statistical data.—Ed.]

IN 1749 China's population was apparently about 177 million, which is some 60 million more than our own at present. From 1749 to 1759 China gained 17 million people, according to the official figures, which is about the same number that the United States seems likely to gain between 1920 and 1930. From 1759 to 1771, China increased about 20 million people in the 12 years. Then, apparently more complete census returns were achieved or else new provinces were included, for in 1775 the return is over 50 millions higher. From 1780 to 1790 the incerase was 24 millions; then the population seemingly remained stationary for a decade, but by 1820 was around 350 millions, a gain of 50 millions or more during the preceding 30 years, which is about the same increase per year as in the United States at present. Only 15 years later, in 1835, a population of 400 million was reached, according to the Chinese statistics, and by 1850 the population had risen to 429 millions, an increase of 25 millions during the preceding 15 years. Since 1850 the population of China has remained more or less stationary, and was estimated by the Chinese post office in 1923 (undoubtedly the most reliable estimate) at 438 millions for China proper and Manchuria. The increase in population in Manchuria more than accounts for this 13 millions gain since 1850.

The population of China, in other words, appears to have reached a saturation point under the old economic and technical régime; the struggle for existence has become a very real thing; and war, famine, disease and the other factors, which Malthus included under the terms misery and vice, are keeping the population within the limits set by the natural and technical resources.

Although we may place our hopes in the minds of men, and even more in the social and economic ambitions of women, and trust that our country, at least, may escape this fate which has befallen China and which seems to be facing nearly all other countries of the world (except France and some of the British Dominions), it seems worth while, nevertheless, for China's sake if not for our own, to consider the present conditions in that country, especially with reference to the utilization of the land, and inquire whether the development of modern agricultural and industrial technique could ameliorate the situation. Our interest in Chinese agriculture is justified not only from the humanitarian and scientific standpoints, but also because the adoption of modern agricultural technique by Chinese farmers would have very important economic consequences for the people of the United States.

May I note in this connection that I am speaking this evening as a University professor, that I have not submitted a memorandum or manuscript for approval by the United States Department of Agriculture, and that the Department is in no wise responsible for what I may say. However, I surmise that if authority to speak were requested, the Department would approve most, if not all, of my conclusions. It is because I have been temporarily a university professor that I am able to exhibit the cultivated land, crop, and farm animal maps before you. These are based on data, by Hsiens, published in "Statistical Tables of Agriculture and Commerce, 1918," Department of Agriculture and Commerce, Peking, 1922, which I have been able to edit while teaching in Clark University this spring.



Land Area

The total area of the 18 provinces of China proper is about 981 million acres, or a little over one-half that of the United States. If Manchuria be added, where the Chinese share the government to some extent with both the Russians* and the Japanese, the total area becomes 1,214 million acres, or nearly two-thirds that of the United States, and if Mongolia and Sin Kiang (commonly called Chinese Turkestan) be included,—both are vast deserts mostly—the total area is increased to 2,441 million acres, which is an area nearly a third larger than that of the United States. Half of the area of the Chinese Republic, thus defined, it will be noted, is included in China proper and Manchuria, and half in Mongolia and Sin Kiang. Thibet is omitted because the Chinese appear to have lost control over that country.

Land Resources

As in the United States, the eastern portion of this vast Chinese Republic, especially the southeastern portion, is humid, while the Western and Northwestern is arid, more arid than our western states. Climatic records are few in China and in the northwestern provinces and Mongolia are lacking almost entirely. Nevertheless, with the aid of observations concerning the native vegetation, it does appear possible to estimate the area having sufficient rainfall for crop production within an error of 10 or, possibly, 15 per cent. This area is estimated roughly at 1,300 million acres, or slightly over one-half of the entire area of the Chinese Empire, excluding Thibet. In the United States only one-fourth of the land area is too dry for crop production. The proportion of the land too dry for crop production in the entire Chinese Empire (excluding Thibet) is therefore about twice as great as in the United States.

This lower proportion of humid and sub-humid and semi-arid land in the Chinese Empire than in the United States is owing primarily to the east-west trend of the Himalaya mountains and several low ranges which extend eastward from the Thibetan Plateau more than half way across China proper. These mountains cause the precipitation on their slopes of much of the moisture in the winds blowing northward in the warm season from the Indian ocean and the South sea; whereas in North America the broad open Mississippi Valley permits the moisture-bearing winds from the Gulf of Mexico to blow unimpeded across the Central States and on into Canada. As a consequence the lines of equal annual rainfall trend north and south across the plains region in Central North America, whereas in southeastern Asia they trend from the southwest toward the northeast.

The land in the Chinese Republic too dry for crop production, located nostly in Mongolia and Sin Kiang, like

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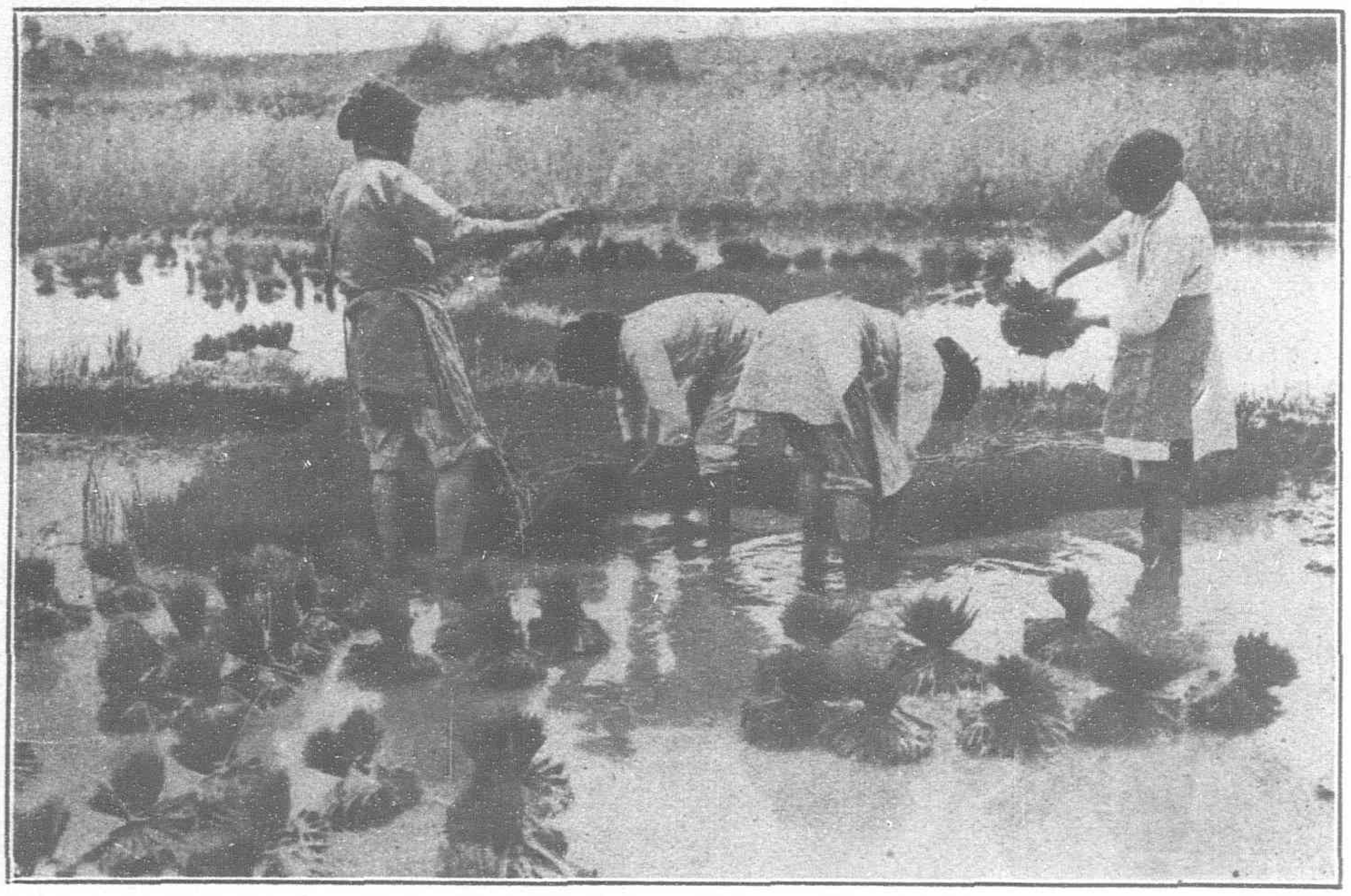
*The Russians no longer have Governmental rights in Manchuria —Ed.



Women at Work in a Chinese Rice Field

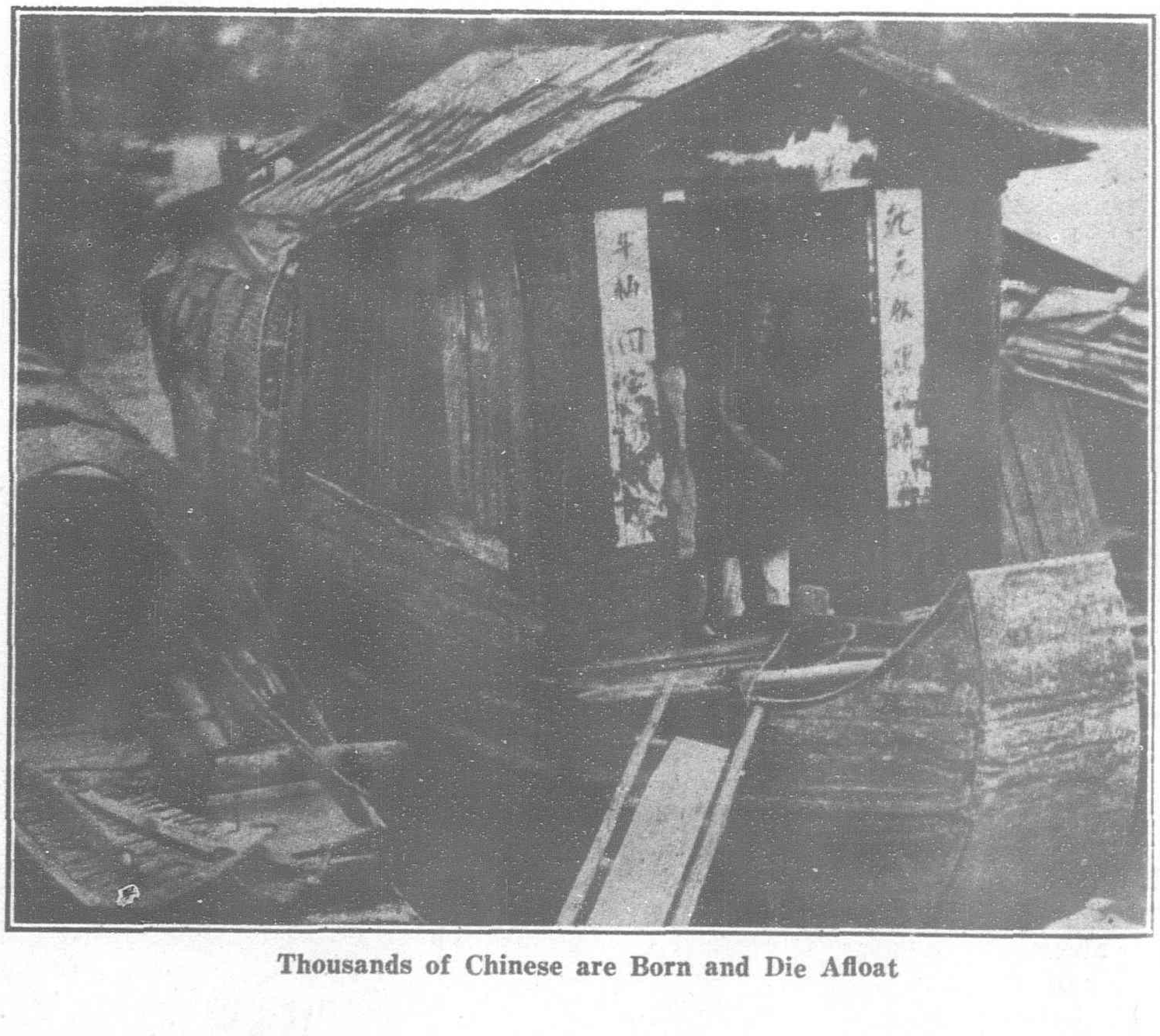
that in the United States, is used to a large extent for grazing livestock, principally cattle, horses, sheep and goats. Much of this area, however, is too dry even for grazing—probably a larger proportion than in the United States, where less than 10 per cent. is too arid for the grazing of sheep.

Over 90 per cent. of the area in the Chinese Republic having sufficient rainfall for crop production is included in the 18 provinces of China proper and Manchuria. The area in Inner Mongolia having sufficient moisture for crops is estimated at 64 million acres, or 100,000 square miles, but this is only a guess and probably an optimistic one. In Sin Kiang (Chinese Turkestan) the present area under cultivation is about two million acres, mostly non-irrigated, according to the Chinese statistics. The few climatic records in this province show an almost rainless climate, but these records are from irrigated districts. We have allowed (not estimated, for the data do not exist on which to base an estimate) 34 million acres of potentially arable land in this province. The total cultivated areas outside of China proper and Manchuria, therefore, is probably not in excess of 100 million acres, or less than 8 per cent. of the total arable area of the Republic.

The other climatic condition that limits crop production is temperature. China has a more southerly location than the United States, the center of area, and of population also, lying in about latitude 30, as compared with latitude 40 for these centers in the United States. As a consequence, there is only a very small proportion of the area having sufficient rainfall for crop production in China, that does not also receive sufficient heat. This land in China too cold for crop production is practically restricted to the mountain peaks and high arid plateaus. The area of these high altitude lands too cold for crops, which is located within the regions having sufficient rainfall, probably does not exceed 5 per cent. of the total area in these regions. This may be compared with 9 per cent. for the United States. Subtracting this 5 per cent. from the 1,300 million acres having sufficient moisture for crop production there remain roughly 1,235 million acres having both moisture and temperature conditions that permit the production of crops.

The third physical limitation upon the area of land available for crop production is that of land relief of topography—the lay of the land. As only a few small areas have been topographically surveyed in China, it is necessary to assume that in an area so large as the humid and sub-humid portions of China, nearly all of which land was originally covered with forest, the proportion of the land too mountainous or rough for crop production, would be similar to the proportion in the humid forested area of the United States. Of the 750 million acres originally covered with forest in the United States, about 300 million acres or 40 per cent. are too hilly or rough to use for crops. This is nearly twice the proportion for the United States as a whole, since all of the hilly land in the East and much of the mountainous land of the West was originally clothed with forest, whereas the level and rolling areas of the central and western states were mostly clothed with grass or with desert shrubs. But in view of the fact that China proper contains many mountainous areas and, like the eastern United States, has mostly a humid climate where erosion is more rapid than in sub-humid to arid climates, it seems fitting to apply this much higher figure to determine the proportion of the area of China not tillable, than the 20 per cent. figure for the United States as a whole. Reducing the 1,235 million acres of land in the Chinese Republic climatically suitable for crop production by 40 per cent, there remains 740 million acres as a rough estimate of the area in China climatically and topographically available for crop production.

The fourth physical factor limiting the area of land suitable for crops is the soil. The control of this factor over crop production is not as rigid as that of temperature, which can be altered only by constructing green houses, or using heat in other ways, or that of moisture, which can be overcome in small part by irrigation or drainage, nor even that of topography, which in China is modified over large areas by terracing the hillsides. Soil conditions can be, and are more readily ameliorated by man than these other physical conditions; consequently, it is difficult to say to what extent they would set a limit to crop production, especially in a country like China where labor is abundant and cheap, and the use of fertilizing materials is common practice. However, all forms of amelioration of these physical conditons are expensive, even the modification of soils by the use of fertilizers; and undoubtedly in China, as in the United States, it would not pay to build a rice field on a sand dune, nor, perhaps, to attempt to use a sandy flat for any agricultural purpose.



Thousands of Chinese are Born and Die Afloat

If it may be assumed that the Chinese farmers are no more likely to use very sandy land, or sterile clays than the farmers of the United States, and that the proportion of such soils in two such large and otherwise similar areas is similar, this figure of 740 million acres of land, climatically and topographically suitable for crop production must be further reduced by 5 per cent. to allow for unproductive soils, or to about 700 million acres.

To recapitulate: Nearly half of the 2,400 million acres of land in the Chinese Republic (excluding Thibet) is too arid for crop production. About 5 per cent. of the remaining half (53 per cent.) which receives sufficient rainfall is too cold. Probably 40 per cent. of the remaining 48 per cent. climatically suitable is too mountainous or rough, while 5 per cent. of the remainder is probably too sandy. This leaves only about 29 per cent. of the land area of the Chinese Republic physically available for the production of crops. In the United States the corresponding proportion is 51 per cent.

China has, therefore, about 28 per cent. less land physically available for crops than the United States, *i.e.*, about 700 million acres as compared with about 975 million acres. But as China has a population 280 per cent. greater, the area of land on which it is physically possible to grow crops is at present 1.6 acres per person in China and 8.3 acres in the United States. In other words, the United States now has five times as large an acreage of potential crop land per capita as China.

Land Utilization

As nearly as can be estimated on the basis of existing data, the area of cultivated land in China and its dependencies is about 180 million acres. This figure is obtained after editing the agricultural returns of Hsiens, which correspond to counties in the United States, as published in a volume entitled "Statistical Tables of Agriculture and Commerce, 1918," already referred to. I have edited the Hsien figures in this Chinese publication in much the same way that our Bureau of the Census edits the results of the tabulation of returns by our own census enumerators. The Chinese have been honest in publishing in this statistical volume the most obvious errors, sometimes indicated by a question mark, and after a study of the Chinese statistics I am of the opinion that they are not much worse than the first crude tabulation of our agricultural census returns from the southern states. The number of Hsiens whose figures are inconsistent or obviously wrong are relatively few, and by checking the agricultural data against the estimates of population made by the Chinese Post Office, I believe the error in this estimate of cultivated land in any province, has been brought within 25 per cent., and for China as a whole within 10 per cent.

After thus correcting the most obvious errors in the statistical data, necessarily in a rough and hasty manner for lack of time, I was pleased to find in the 1926 China yearbook an estimate of 180 million acres for the area of cultivated land in China proper and Manchuria.

In 1919 there were about 354 million acres of land in harvested crops in the United States, to which should be added at least 13 million acres of crop failures, and as much more summer fallow. In 1919 there were, therefore, about 380 million acres of cultivated land in the United States, or over twice the acreage in China the previous year. The area of cultivated land per capita of the total population of the United States was in that year 3.6 acres, whereas in China it was about 0.4 acre. In other words, there is about nine times as much cultivated land per person in the United States as in China.

Proportion of Potential Crop Land in Crops at Present

This contrast is not so striking, however, as the fact that the proportion of the physically cultivable land in the United States which is cultivated is nearly 39 per cent., whereas in China the proportion is only about 26 per cent. Why should China, an old country with the severe pressure of population on land resources indicated by this figure of four-tenths acre of cultivated land per person, nevertheless, cultivate a much smaller proportion of its cultivable land than the United States, which is only now emerging from the pioneer period of development and in which the pressure of population on the land is lighter than in almost any other country of the world? One would expect that in China almost every hillside would be terraced to its top, all land it was possible to irrigate would be irrigated, all land it was possible to drain would be drained, and that long since settlers would have pressed out upon the subhumid prairies of Manchuria and the semi-arid plains of Inner Mongolia, instead of having just started to do so, almost timidly, during the past quarter century. Why do large tracts of tillable land lie untouched. I am told, in the neighborhood of many cities, sometimes even within the city walls, as at Nanking? To this seemingly anomalous situation in China let us now devote our attention primarily. The answer to this question is to be found, I believe, principally in two words, **Machinery** and its corollary, **Power.**

Power on Farms in the United States

In the United States progress in agriculture, perhaps fully as much as in manufacturing and mining, has been dependent upon the development of machinery and of power to operate it. The plowing of a 40 acre field, six inches deep involves the movement of 50,000 tons of earth, and the distance traveled using a single 12 inch plow is fully 330 miles. At two miles an hour, this would require 165 hours or over 16 days of 10 hours each. But think how much more laborious the effort and how much longer time would be required if this 40 acre field had to be spaded by hand, or, perhaps, we should say by foot. Obviously, it would be beyond the capacity of one or even of several men in a single season.

The average area of cultivated land per farm in southern China, where rice is the important crop, and is usually followed the same season by some other crops, is 1 2/3 acres. But in northern China, where wheat, millet and the sorghums are dominant, and only a part of the land grows a second crop the same season, less labor per acre is required and the farms are twice as large, averaging about 3 1/3 acres of cultivated land per farm. The average area of cultivated land per farm for all China, including Manchuria, where the farms are still larger, is 3.1 acres. Probably this is about as large an area on the average as a farmer and his son, or hired man, can comfortably cultivate by using hand tools. In the United States the average acreage of crops per farm, including the small negro-tenant cotton farms of the south, is 57 acres, which is eighteen times the average acreage of cultivated land per farm in China. This 18-fold greater acreage of crops per farm in the United States than in China is made possible by the use of machinery and of power adapted to its operation.

The horsepower available on the farms in the United States in 1924, two-fifths supplied by horses and mules and three-fifths by mechanical engines, was about 52,300,000. This was 58 per cent. greater than the horsepower available in all the factories of the United States. On the other hand, the amount of labor employed in agriculture, including the labor of farmers and their families, was 17 per cent. less than that employed in manufacturing. The average horsepower per man available in agriculture is nearly 6¼. whereas in manufacturing it is only 3¼.

Neither of these figures includes the power developed by the laborers themselves. In manufacturing, this is almost insignificant — the employees in most industries merely watch and guide the machines, or help to administer the organization. But in agriculture muscular labor is still significant—perhaps one-third as much energy is expended as would be if no machinery existed. If a man's physical strength may be considered to equal one-sixth that of a horse, we should add to the 52,360,000 horsepower available on farms about 500,000 more horsepower of human labor, which would raise the total to nearly 53,000,000. Were the farmers and farm laborers in the United States dependent for power solely upon their own muscles, they could develop less than 3 per cent. of the power available to them on farms at present.

Let us compare this power available to the average farmer and farm laborer in the United States with that available to the farmers and farm laborers in China.

Power on Farms in China

The principal sources of power on farms in China are men, cattle and horses. There are over 60 million farm families in China—almost ten times as many as in the United States. Let us assume that these farm families average two farm workers—the farmer and a son or a hired man. This was the case in the United States until recent years, but now there are only about one and three-fourths workers per farm. Let us further assume that these 120 million farm workers exert their full muscular strength in their work. As a man's power is about one-sixth that of a horse, the power developed by these 120 million men is equivalent, perhaps, to that of 20 million horses.

The average number of horses, mules and asses in China and dependencies in 1914 and 1915, for which years data are available for all China, was about 9,700,000, and the number of cattle 22,000,000, which apparently includes water buffalo, if the statistical data given in the 1918 report previously referred to may be accepted for live stock without editing, which I have been unable to do.

These figures indicate that China has nearly two-fifths as many horses, mules and asses, and one-third as many cattle as the census reports on farms in the United States. Let us assume that all these horses, mules and asses in China are used to develop power on farms, although the Chinese statistical reports indicate that the figures include all horses, mules and asses in each province, many of which are probably used for transportation. And let us further assume that each cow or steer, ox or calf develops as much power as a horse, certainly an overestimate. Adding the 20,000,000 horse power potentially available in the farmers and farm laborers themselves to the 9,700,000 horses, mules and asses, and the 22,000,000 cattle, an estimate is reached of nearly 52 million horse power available for agricultural production in China and dependencies. This is a maximum estimate. Undoubtedly half the horses and mules and probably three-fourths the cattle in China are used for power on farms. These proportions indicate a minimum horsepower available on Chinese farms of 36,000,000.

Power Per Acre and Per Man in China

It appears, therefore, that China has between 70 and 100 per cent. as much available power on farms as that in the United States. This power available for the production of crops needs to be considered from two standpoints : (1) that of the land, or the amount of power available per acre, and (2) that of the man, or the amount of power available per person employed in agriculture. Dividing the 180 million acres of cultivated land by 44 million horse-power (an average of the maximum and minimum estimate), it appears that the average area of cultivated land per horse-power in China is about 4 acres. In the United States it is about 7 acres. In other words, the farmers of China have available nearly twice as much power per acre as the farmers in the United States.

Moreover, it seems likely that a larger proportion of this available power is utilized in China, because nearly half of it consists of human labor, which undoubtedly is kept employed most of the year, owing in part to the warmer climate. In the United States the power available is mostly that of horses, mules and tractors, which are in use a surprisingly small proportion of the year. In view of this more continuous use of power in China it is not unlikely that four times as much power is applied to the average acre of crop land as in the United States.

Let us now view the matter from the standpoint of the man or the amount of power available per farm. Dividing the 44 million horse-power by the 62 million farms, we have an average of less than three-fourths of a horse-power per farm. In the United States the average is over 8 horse-power per farm, or fully 10 times as much.

Apparently land is scarce in China compared with the United States, and men are cheap, for the Chinese apply probably four times as much power to the acre of crop land as we do in the United States, while we put ten times as much power in the hands of each farmer. But we will recall that the proportion of the cultivable land in China which is cultivated is only about 26 per cent., whereas in the United States it is nearly 30 per cent. With almost as much power available as in the United States, why should the Chinese leave 520 millions acres more or less, of their tillable land untilled, an amount which is nearly three-fourths of their tillable area ?

Influence of Limited Power Per Man on Land Utilization

This concentration of power in China on the best land seems to be owing primarily to the character of the power available, and to the use of hand tools rather than of modern machinery. About half of this power available on farms in China is human labor, whereas in the United States human labor probably does not constitute over three per cent. of the total. Human labor without the use of agricultural machinery and a relatively large amount of power cannot produce enough food on poor land to maintain a family. The man with the spade and the hoe cannot dig up and cultivate more acres of poor land than of good land. Even if he has a horse or mule, which perhaps one-tenth of the farmers of China have, or an ox, which perhaps three-tenths more of the farmers possess, he can plow at most only a few acres. For the Chinese farmers who depend on their own muscles solely for power—and these constitute according to the statistics over half the farmers of China—two acres per farm or one acre per man in the rice regions and twice as much in the wheat and millet regions, seems to be the average amount of land that can be spaded and cultivated by the farmer and his son or hired man in the period of time permitted by the progress of the seasons. These two to four acre farms must support five to six people. These 5 or 6 people will eat 10 to 14 bushels of wheat, or equivalent other food, per person yearly, which is 50 to 80 bushels of wheat or equivalent per family. As the average acre yield of wheat in all China is apparently less than 12 bushels, it undoubtedly does not exceed 8 bushels on the semi-arid or less fertile soils. This is about the acre yield on such soils in the United States. It would require, therefore, 8 to 10 acres of these lands to grow enough wheat to feed a family, which is twice the average acreage per farm in the wheat growing regions. Even on the better land, it is obvious that to produce enough food for a family to live on the farmer must either grow another crop on the land the same year, which many farmers do, or else cultivate a larger acreage by means of horses, mules or cattle.

Most of the horses and mules in China are in the wheat and millet growing regions of northern China, where the land yields only one-third to one-half as much food per acre as in the rice growing regions of southern China. The less productive crop per acre requires the cultivation of a larger acreage per farm and utilization of more power.

The acreage of cultivated land is, in general, less dense in southern China than northern China. This may be owing in part to a smaller proportion of tillable land, but it is also doubtless owing in part to the fewer work animals and the opportunity which the rice crop affords of concentrating human labor on the best lands. Obviously the man who is dependent on his own muscles and can, therefore, handle only 2 or 3 acres, must cultivate the more fertile land in order to obtain enough food for himself and family to live on, and must, if possible, grow the most productive crop, which is rice. Not being able to increase the acreage, he must increase the yield per acre by every means. He must irrigate wherever possible, —one-third of the cultivated land of China is irrigated, as compared with less than 6 per cent. in the United States. He must fertilize every plant, because every plant is precious.

It is principally the small quantity of power available per man, particularly for plowing the land, I believe, that restricts the utilization of the land in China to about one-fourth of the potentially arable area.

The ability to utilize low grade land for crops, which the farmers of the United States possess because of their command of power, is best illustrated perhaps by the semi-arid portion of the Great Plains region. Here, where the yield per acre is low, the cost of production is kept low by the use of the most efficient machinery. In Western Kansas there are about 140 acres of crops per farm, in eastern Washington nearly 200 acres. Although the land may yield only 7 or 8 bushels of wheat per acre, the production per farm is 1,000 bushels of wheat, or more. Compare this with the 30 to 50 bushels of wheat and millet which the Chinese farmer could produce by hand tools alone in the semi-arid northwestern provinces of China,—not more than half enough to sustain a family.

This dependence on machinery and power in regions of deficient moisture is as true with reference to cotton as to wheat. Farmers are " sledding" their cotton in the Texas Panhandle, thus gathering 10 to 20 times as much per man as could be picked by hand, just as they harvest their wheat with a binder or combine. They cannot afford to pick the cotton crop by hand, unless it is high in price. Despite low prices, the production of both cotton and wheat continues to expand in this Great Plains region, while the acreage of all crops contracts in the mountainous portions of the eastern states, because the Plains land is well adapted and the mountain land is poorly adapted to the use of machinery.

It is significant that the vast steppes of Southeastern Russia and Manchuria, as well as the grassy plains of Agrentina and of the United States and Canada awaited the development of agricultural machinery during the latter decades of the 19th century before they were plowed up and planted to crops.

The Possibility of Power Farming in China

The existence of these 500 million acres, more or less, of uncultivated tillable land in China an area, approximately equal to that in the United States, and fully 2½ times as great as the cultivated land in China, is a challenge to all those who are interested in the welfare of China. It is my opinion that much of this land located not over 30 miles from a railroad, especially the sub-humid to semi-arid land in the northwestern provinces, could be profitably plowed and seeded to wheat by using machinery such as is used in our own wheat growing regions. Whether tractors or horses would prove the cheaper source of power could be determined by a few season's experience on an experimental farm, or, perhaps, even on the basis of existing information. The utilization of unused land would afford employment for a few Chinese, and could not occasion complaint that machinery was displacing human labor, such as would arise if machinery were used on the rice lands of southern China, or the lands in northeastern China already growing wheat.

The fact that the United States exports wheat to China almost every year, and many years exports rice also, suggests, however, that modern machinery could economically be utilized on the best rice and wheat lands. But the displacement of human labor that would result from the extensive use of modern farm machinery on the cultivated lands of China would have such serious economic and social consequences, that it should be undertaken only with the utmost caution. Unless industry developed in the cities with sufficient rapidity to absorb the surplus rural population that would result, as industry is doing in the United States at present, the replacement of men by machines in the agriculture of China would probably mean the starvation of millions.

The expansion of industry in China, like the expansion of agriculture, is dependent, it would seem, upon the further development of power. The increase of power in China is, apparently, in turn dependent primarily upon the consumption of coal. Whether a rapid increase in consumption of coal can be economically secured by the exploitation of China's own supply, or must be dependent in large part upon imports, or whether neither domestic production nor importation of coal is likely to increase very rapidly, and the consequent expansion of industry in China to the American or European magnitude is economically impossible, I am incompetent even to possess an opinion upon. But I can state, perhaps with as much authority as anyone need possess, that under the conditions existing in China, notably with the best land already utilized for crops, agricultural production cannot increase as rapidly as population might increase if it were not restricted by the food supply. Let us devote a few minutes to this subject of agricultural production in relation to population in China.

Agriculture Production and Population

Although the yields per acre of rice in China are apparently, about 40 per cent. higher than in the United States, the acre-yields of the other cereals are so much lower, if we have converted the Chinese units of measure into English units correctly, that the average acreage yield of all the cereals for which comparison can be made, principally rice, wheat, corn, barley, and the grain sorghums, is, according to the official data, which in part is confirmed by unofficial data I have received, about 20 per cent. lower in China than in the United States. With only two-thirds as much of the tillable land actually tilled in China as in the United States and with the acre yield of the cereals (which include over ¾ of the cultivated land in China and nearly ½ in the United States), possibly 20 per cent. lower in China than in the United States, is it not possible that agricultural production in China may increase more rapidly than population, and the standard of living, therefore, be raised? To this question the future will probably answer, **No,** unless the volume of manufactured products increases more rapidly than the volume of agricultural products.

Agricultural production is not capable of a rapidity of expansion comparable with that in manufacturing. Agriculture is based on the land and good land is limited in extent. Land, moreover, normally can be cleared, reclaimed, or otherwise prepared for crop production only slowly. In the United States, for instance, the most rapid increase in agricultural production was probably during the two decades 1869-1889, when agriculture expanded onto the very fertile prairie lands of the Upper Mississippi Valley,—probably the largest area of land of high fertility in the world. The increase in agricultural production during these twenty years was over 100 per cent. or at the rate of 4 to 5 per cent. a year. After the best land had been brought into use, about the year 1900, agricultural production increased less rapidly,—about 11 per cent. between 1899 and 1909, 13 per cent. between 1909 and 1919, and about 5 per cent. during the 5 year period 1919-1924. During the past few years, for the first time since 1900 agricultural production increased more rapidly than population,—14.8 per cent. as compared with 8.7 per cent. increase in population during the 5 year period. This more rapid increase in agricultural production since the World War is the principal cause of the present depression in agriculture, and, being caused by very exceptional conditions, is certainly transient.

But these increases in agricultural production are small compared with the increases in manufactured products. From 1899 to 1909 the physical volume of manufactured products increased 59 per cent. according to the recently completed index tables compiled from the census returns by Day and Thomas. From 1909 to 1919 the increase was only 36 per cent., but in the four years from 1919 to 1923 the increase was 22 per cent. and all of this increase occurred between 1921 and 1923. Manufactured products, in other words, are increasing from 3.5 to 11 per cent. a year, or at an average rate during the past quarter century about four times that of agricultural production.

Agricultural production per capita of the total population in the United States decreased 8 per cent. between 1899 and 1909 and has scarcely held steady since 1909, whereas the per capita production of manufactured products has nearly doubled since 1899. The increasing income per person in the United States and rise in general welfare, is obviously to be attributed primarily to the increase of manufactured products, rather than of agricultural products.

If agricultural production in the United States during the past quarter century has increased less rapidly than population, except during the few years since the World War, despite all the advance in scientific knowledge and the development of a vast organization for dissemination of this knowledge and promotion of agriculture, how can agricultural production in China be expected to increase as rapidly as population might increase if it were not restrained by poverty and disease?

The principal hope for improvement in the general welfare of the Chinese people is to be found in the rapid expansion of manufacturing—so rapid that it will be greater than the increase in population. If manufacturing can be expanded so rapidly as to attract labor from the farms more rapidly than men can be born and raised on the farms, thus encouraging greater efficiency in agriculture, as well as manufacturing. China will have solved its population problem. Whether or not such an expansion of urban industry in China is possible, I have no knowledge.

Consolidation of Bucyrus and Erie Facilities

DURING the year announcement has been made of the merger of Bucyrus Company and Erie Steam Shovel Company.

Bucyrus-Erie Company, born with the new year, begins its activities with the following officers:

W. W. Coleman, *President;*
E. K. Swigart, *Senior Vice-President;*
F. B. McBrier, *Vice-President;*
A. C. Vicary, *Vice-President;*
G. A. Morison, *Vice-President* and *Treasurer;*
D. P. Eells, *Vice-President;*
W. M. Bager, *Vice-President;*
J. G. Miller, *Secretary.*

W. W. Coleman will be Chairman of the Board of Directors, W. B. Given, Jr., Vice-Chairman of the Board of Directors, and M. D. Follansbee, General-Counsel.

This consolidation of Bucyrus Company, the largest and oldest manufacturer of excavating machinery in the world, with Erie Steam Shovel Company, who have produced more small revolving shovels than any other manufacturer, without doubt marks the beginning of an era of a new standard of greater service to users of excavating machinery. Financial stability, assuring a permanent and reliable organization behind every machine manufactured; enlargement of world-wide service, bringing expert representatives into closer touch with every part of the field of excavation; increased modern shop facilities, insuring prompt deliveries; and a complete line of equipment, including all sizes from the smallest to the largest, as well as all types of excavators under all kinds of power, will enable this new company, inheriting as it does all the long experience of the Bucyrus and Erie organizations, to be of the greatest value to the excavating industry.

The Underground Electric Railway of Tokyo

The First of Its Kind in Japan

By Eissburo Kusano

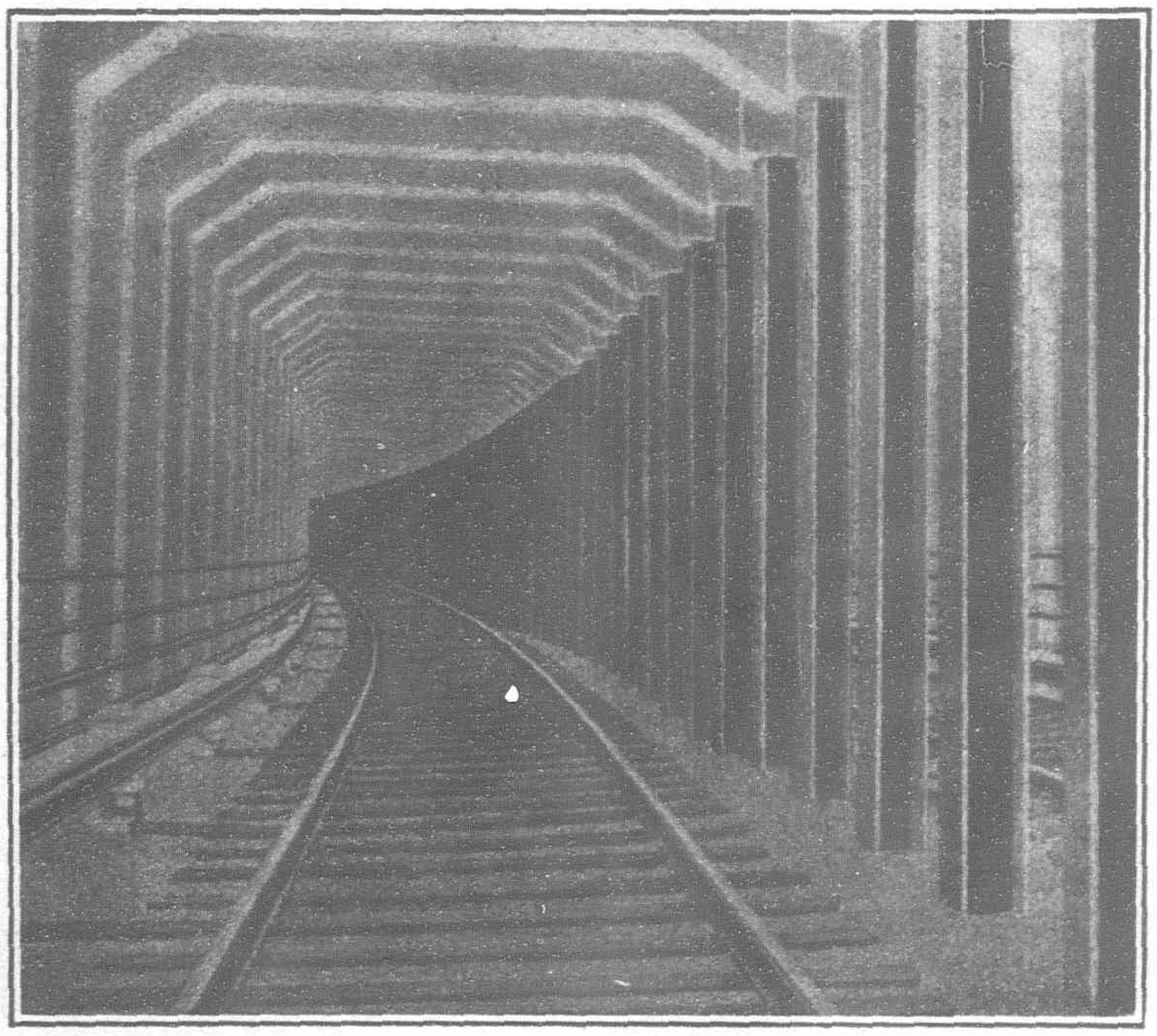
FOR the first time in Japan, the underground electric railway was opened between Ueno and Asakusa, Tokyo, a distance of one mile and 28 chains, on December 30, last year, by Tokyo Chika Tetsudo Kabushiki Kaisha, or the Tokyo Underground Railway Company, which is capitalized at Y.20,000,000. The cost of construction amounted to Y.6,200,000 in round figures, inclusive of Y.5,000,000 for the railway construction, and the remainder for the building of ten cars, a car-shed, and four stations, etc. The per mile cost of construction, therefore, reached a rather heavy total of Y.4,133,000.

In a press interview given by Mr. Tetsuji Hayakawa, executive director of the company, at its head office (Okawa-Tanaka Jimusho, Marunouchi, Kojimachi-ku, Tokyo), he said:

"I thought of opening an underground railway when I saw one in London in 1914. Upon returning to Japan the same year, I drafted a plan, but hardly any one accepted it as a practical business proposal."

It was in 1920 that the first step of Mr. Hayakawa's "dream" was realized; the Tokyo Underground Railway Company was established that year. According to the original plan, the company was to be capitalized at Y.40,000,000, but Mr. Hayakawa had to be contented with Y.30,000,000. The original plan provided that the subway run through the centre of the city underneath the ground from Asakusa to Shinagawa, but this distance, too, had to be shortened between Ueno and Shimbashi, or 1.3 miles.

With the approval of the Department of Railway, the actual construction was commenced, and the work was making a smooth progress with the boring completed, when the great earthquake of September, 1923, occurred. The undertaking came to a standstill, as the result.



The Tokyo Underground

Mr. Hayakawa was not discouraged, however. He reduced the capital of the company to one-third or Y.10,000,000, and started the construction of an altogether new line between Ueno and Asakusa, instead of Ueno and Shimbashi. This was in September, 1925. A great deal of minor troubles—such as the bursting of a gas tube, injury to operatives in the employ of the construction work—were in store for Mr. Hayakawa, but he managed to conquer them, and went ahead with the work. In 1926, the capital was increased by Y.10,000,000 to Y.20,000,000 as the work made a good progress, and thus, the first underground electric railway in Japan was accomplished.

There are four stations, namely, Ueno, Inaricho, Tawaramachi, and Asakusa. The one striking feature of these stations is that they are equipped with the automatic turnstile instead of ordinary wicket. The fare is a uniform rate of 10 sen.

Going down from 23 to 24 steps, one alights upon the platform which is about 180 feet long, and there is a car, which is about 53 feet long. There are three each of doors on both sides of the car, which are electrically operated from inside by the conductor. One of the characteristic novelties of the car is that it is lighted indirectly; there are 34 lights each on both sides of the upper end of the windows, and they are unseen. Another feature is that the car has no poles.

Officially, the capacity of accommodating passengers is limited at 120, but, it was proved, when students of the Iwakura Railway School had a trial ride, that, at pinch, each car could easily accommodate 250 passengers. Six of these cars may be connected in a train, but at present only single cars are now being operated at every three minutes.

The transformer station of the company stands at Man-nencho, Shitaya-ku, Tokyo, near to the Ueno station, and two 12,000 volt transmission lines keep the car going.

Business Prospects

On the average, approximately 50 passengers availed themselves of the newly opened underground electric railway a day during the first half of January, this year. At one time, the number of passengers totaled 130,000 a day.

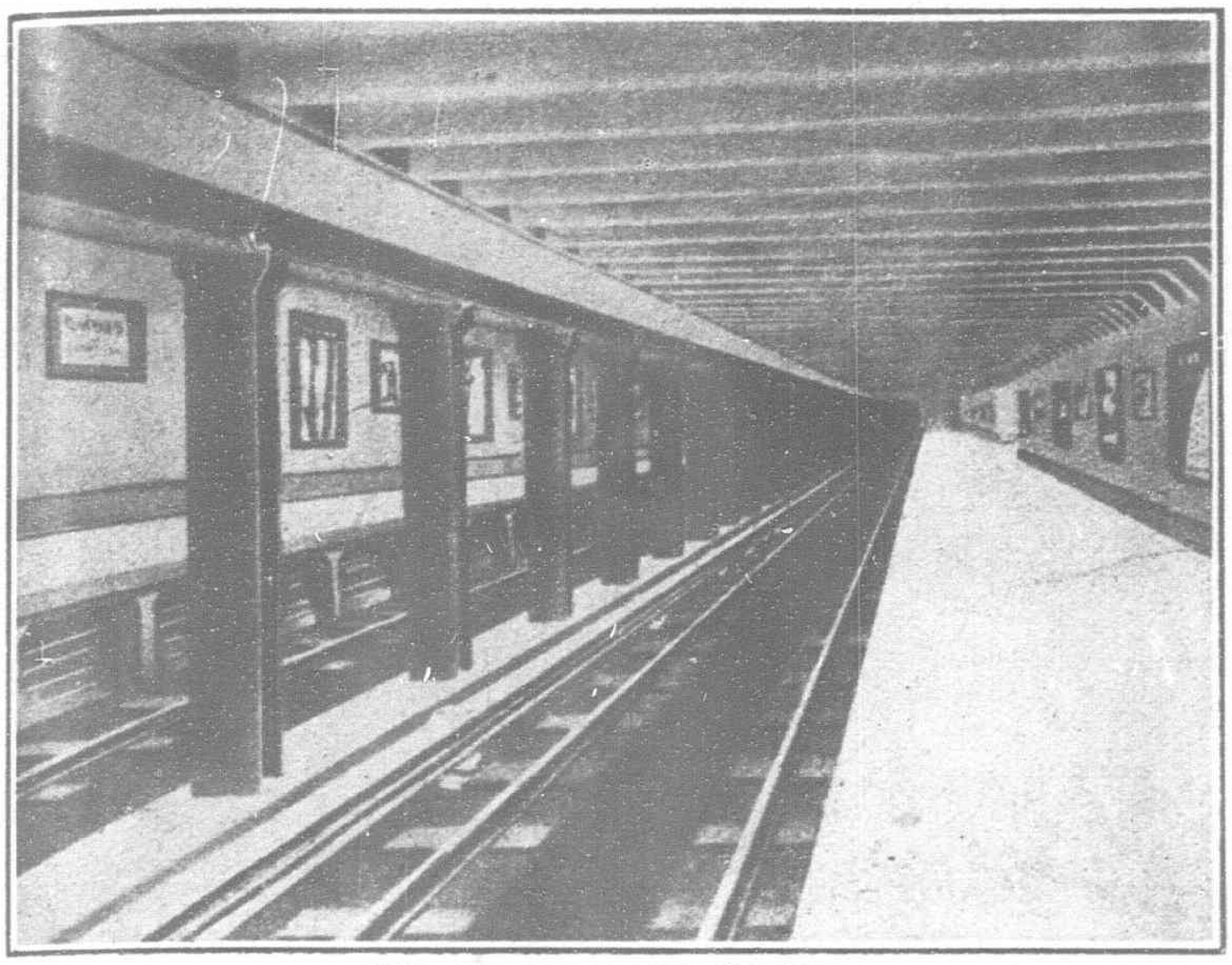
The prospectus of the company, however, estimated the number of passengers at 25,000 a day, and based on this estimation, the following balance sheet was drafted: (Unit: yen).

Income ...	932,500
Including :—	
Passenger revenue ...	912,500
Advertisement and others ...	20,000
Expenditure ...	249,813
Including :—	
General expenditures ...	16,240
Car operation...	150,865
Motive power...	40,678
Upkeep of sub-station...	6,140
Upkeep of cars	14,120
Upkeep of rails	6,130
Upkeep of electric lines ...	4,640
Upkeep of buildings ...	1,000
Miscellaneous expenditures ...	10,000
Balance :—	
Excess of income ...	682,687

In comparison with the foregoing business prospectus, the actual business condition at the opening of the line is exceedingly favorable. Included among the causes which accounted for such an enormous number of passengers are: (1) On account of its being a novelty, a large number of people have a trial run just for fun. (2) The car fare is dearer than the Municipal tram-car by three sen, but the underground railway takes only about five minutes between Ueno and Asakusa while the other takes about 10 minutes. (3) The accommodation of the underground is superior to that of the Municipal tram-car, and therefore, the passengers find it more comfortable.

One cannot decide at once, however, whether the underground railway company will be able to maintain the foregoing favorable business condition for good. It is all the more so in view of the fact that a large number of passengers had a trial ride just for fun.

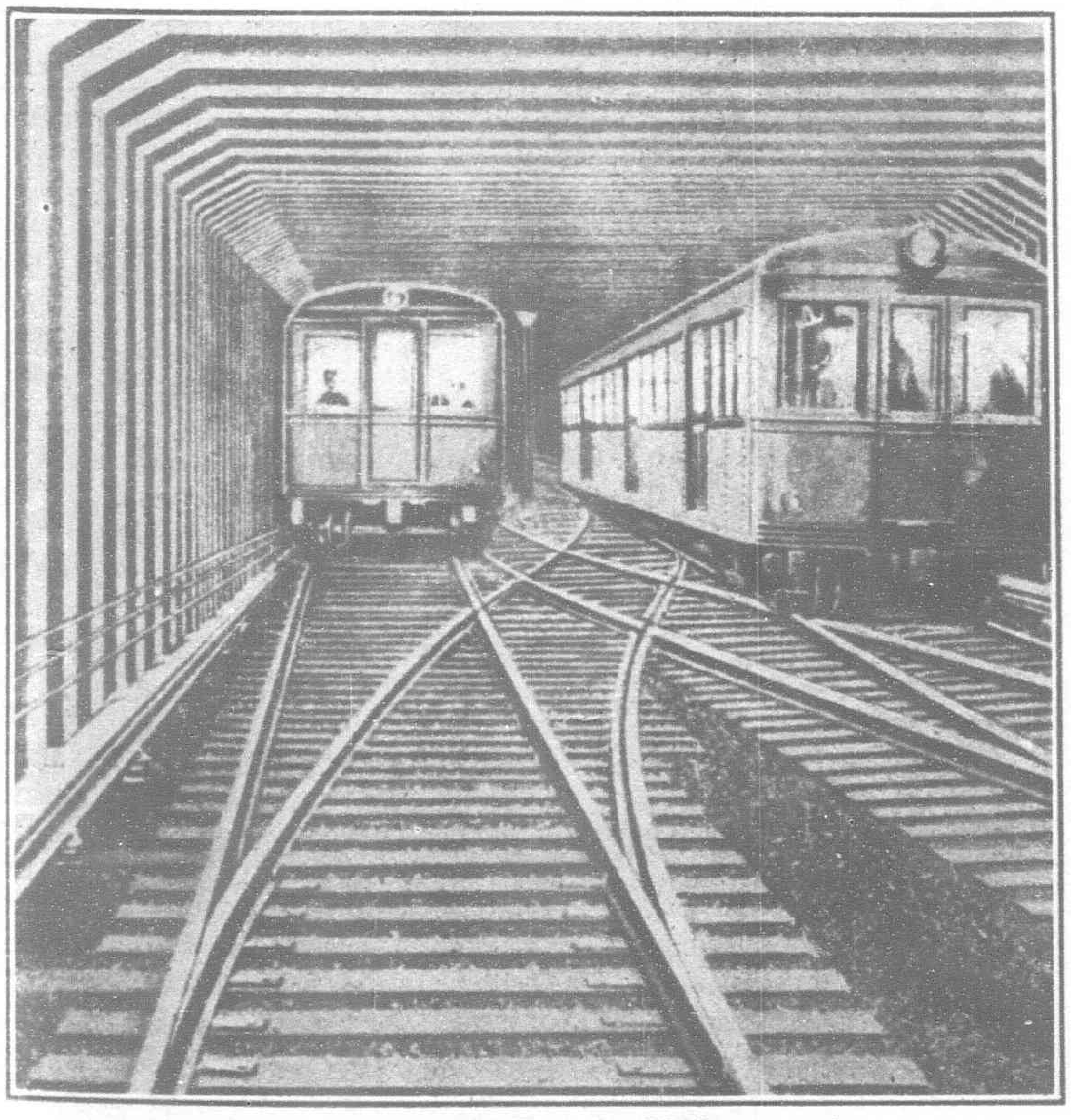
Generally speaking, however, the congestion of the Municipal tram-car has reached its last stage, and so far, no plans of improving the situation is now under way. The Municipal and private motorbuses, which may be regarded as auxiliary organs of the Municipal tram-car system, also enjoy patronage of passengers more than they can actually accommodate. On the other hand, there are parks



The Tawaramachi Station

and recreation grounds at both terminals of the underground railway. Furthermore, the line runs the district which is most popular among the sight-seeing people from rural districts. The number of men passing this part of the city by the Municipal tram-cars, motor-buses, etc., is estimated at about 160,000-170,000. It is probable that about 20 per cent. of these people may avail themselves of the underground, and therefore, the number of passengers of the subway may total about 30,000 a day, which means Y.90,000 of income a month. The annual income, including that of advertisement and other miscellaneous revenue, amounts to about Y.1,100,000. When the expenditure, including the salary, wages, car operation, repair, etc., be estimated at Y.300,000, the net profit of the company amounts to about Y.800,000, which corresponds to 20 per cent. of the paid up capital or Y.4,000,000, and also, it corresponds about 13 per cent. of the entire cost of construction amounting to Y.6,200,000.

This company, however, has loans amounting to Y.4,330,000, in addition to the paid up capital of Y.4,000,000. Estimating the loans were secured at 7 per cent. per annum, the interests to be paid amount to somewhere about Y.300,000, which is not by any means a small sum. With the object of reducing the burden of interests payment, the company called up further payment of the capital to the amount of Y.2,000,000, on February 1, and thus redeemed a part of the loans. Although the interests payment of the loans is thus reduced, more dividend funds are required as the result. In short, the business condition of this company is not yet at its best, and one cannot judge the future possibilities of the company just yet.



All Steel Cars Used in the Underground

Second Phase Construction

The construction of the second phase line, namely, between Ueno and Shimbashi, 1.3 miles, is now under construction. It is expected that the company will complete this line as far as Manseibashi by the end of this year. When the operated line is extended as far as Shimbashi in the immediate future, the company may further extend the line as far as Shinagawa or elsewhere.

Boring for Water in the Philippines

(Continued from page 120).

over drilling operations and the use of government equipment Authority was granted under this policy for drilling an artesian well for the Army and Navy Y.M.C.A. in Manila.

Nineteen drilling machines were in active operation in the year 1926 up to the end of September. Then all machines were laid up except those in use by private parties. Insular funds were exhausted. So in 1926 only 98 wells were drilled, an exception to the steady growth mentioned formerly. Last year more than made up for it however, and at present all machines are in active operation and well drilling is going on apace.

Costs and Financing

The cost of the well drilling work is all borne by taxpayers, and most of the money comes out of the Insular government's appropriations. In the year 1926 the budget called for 250,000 *pesos*, which was forthcoming in the appropriation, and of this total 201,152 *pesos* was spent for actually drilling new wells. The rest was for repair and maintenance of equipment and in purchasing new parts. Also in this item is included the cost of reimbursing some municipalities for one-third of the cost of wells drilled in 1925 and later declared unsuccessful. Part of the cost of drilling public wells in urban districts is borne by district taxpayers themselves. Government expenses range annually from 250,000 *pesos* to 313,000 *pesos*.

Of the 17 per cent. of unsuccessful wells drilled in 1926, one was abandoned owing to the loss of a sand pump in the hole. Six were given up as a bad job when no water was found at considerable depths, and the rest were successfully completed but the water was either salty or otherwise unsuitable for drinking purposes.

Equipment

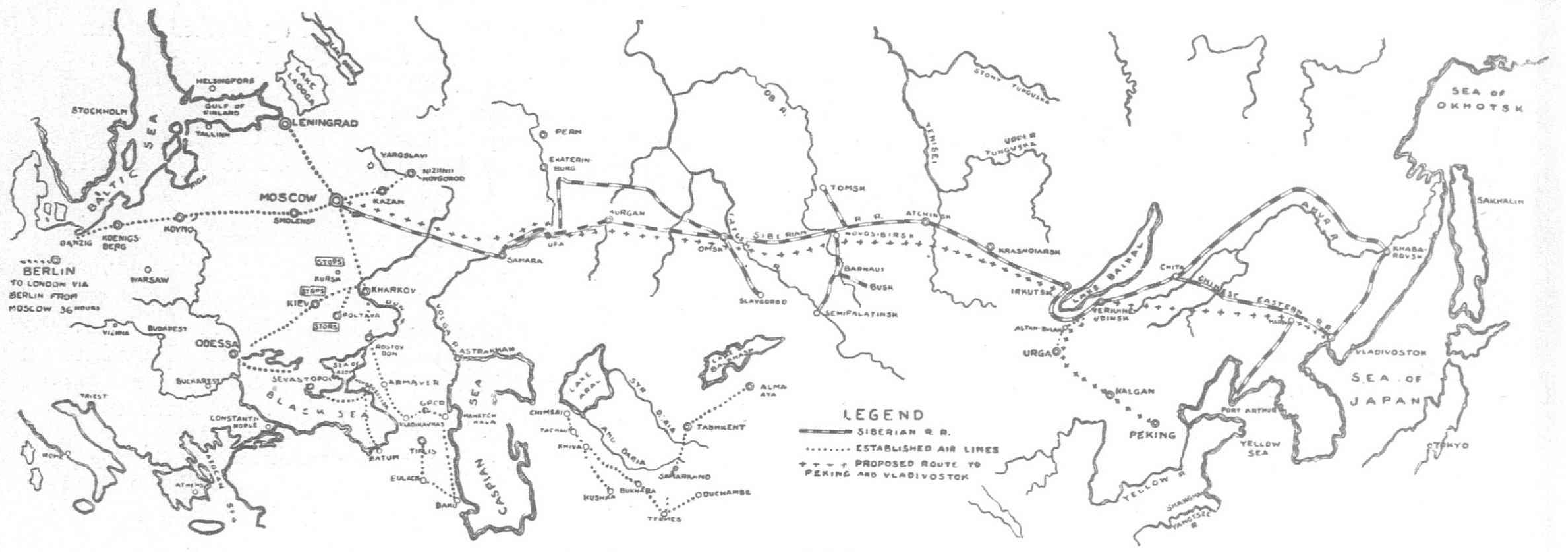
Well drilling rigs imported and used by the Bureau of Public Works are for the most part Columbia machines designed for work in the oil fields. There are in the government's hands now a total of 31 well drilling outfits. One of these is a Cyclone, belonging really to the province of Bulacan. One Keystone rig is operated by Los Banos Quarry, and the Bureau of Public Works operates one Star outfit.

There are 13 Columbia No. 3 rigs in general use, and two Columbia No. 5. In storage are three more Star outfits, one Columbia No. 3, four Columbia No. 5, four Columbia No. 10, and one Standard rig.

Pumps installed by the government in non-flowing type wells are all hand pumps designed and manufactured by the Artesian Well Division of the Bureau of Public Works. Many private concerns have installed motor-driven pumps in their wells and in many other cases municipalities have provided motors for the town pump.

The stock equipment hand pumps are of two types, one a single-action up and down pump handle type and the other a double action arrangement with an oscillating lever.

Work done by the Philippine government in the drilling of artesian wells is a bright spot in a long list of commendable accomplishments in advancing the Oriental standard of living. Furnishing pure water to the native and foreign population reaches a sphere of public service a little above the ordinary. From a philanthropic point of view it reaches almost to the level of medical missionary work, and results seem to be appreciated.



Russia's Commercial Air Lines

Conquest By Air

Russia Plan to Dominate the Air Ways of Asia

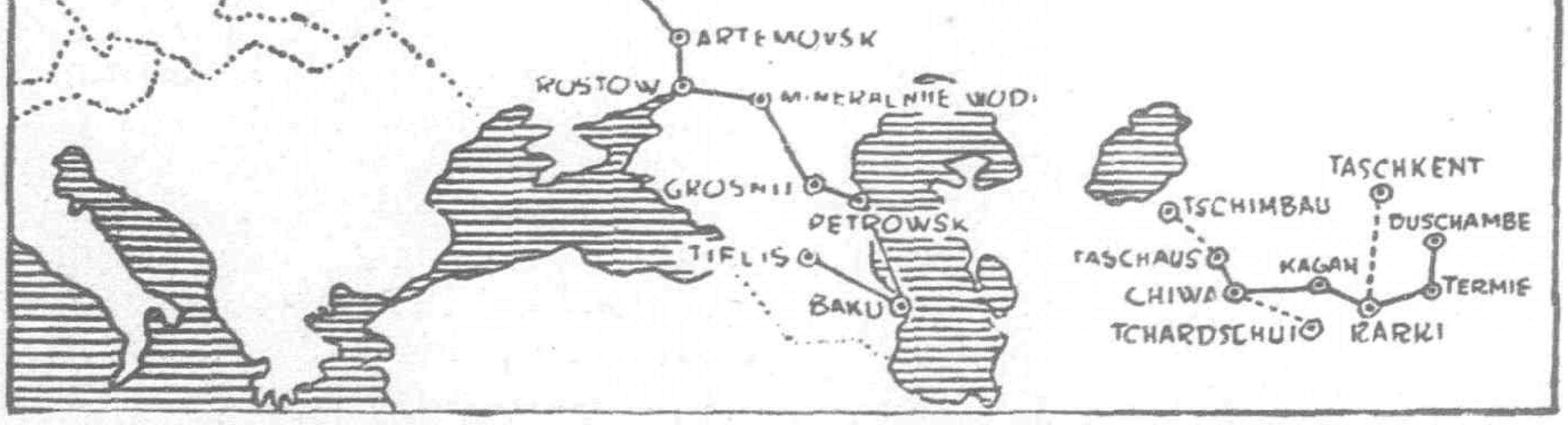
EVERY now and then our Big Navy or Fighting Air Force experts remind us that Japan may some day raid the Pacific Coast cities with her fleets of airships and aeroplanes. Rear Admiral Bradley A. Fiske in his latest analysis of America's naval position in the Pacific, stresses the use of airplanes by the Japanese in a future war with this country. Japan is always the hypothetical enemy of the United States in the Pacific. Whatever Japan does to increase her power of defense is accepted by our strategists as a new weapon of offense against the United States. Americans refuse to see that Japan's real enemy is, and always has been, Russia. It was Russia's determination to reopen hostilities as soon as she was in a favorable position, that compelled Japan after the Peace of Portsmouth to increase her military and naval forces to the point where she was accused of being a militaristic nation. Staggering under the tremendous burden of reconstruction and business readjustment at a time when every yen she can raise in revenues is needed to stabilize her finances and industry, Japan is once more called upon to keep pace with the war preparations of her giant adversary. Russia has given up her old program of conquest by railway. The Soviet dreams of conquest by the air and is carrying forward a huge scale propaganda to build up the most formidable air force in the world. Her vision is again directed Eastward, to Central Asia, to China and beyond. Japan cannot afford to close her eyes and go to sleep. She must keep keyed up, ready for the emergency. Russia's tremendous effort to develop an overwhelming air force is being answered by Japan.

Experts who have studied Russia's preparations for war agree that none of the great nations of the world is developing the "air-sense" amongst its citizens as is Soviet Russia with its nearly 4,000,000 members of Aviokhim, the national air society dedicated to making Russia pre-eminent in the air. German aeronautical engineers, restricted by the Allies from building airplanes of certain sizes in their own country have emigrated to Russia to construct their planes, an evasion of treaty terms under which Germany is creating in Russia a reserve force of military airplanes. Whether the combination is being used for military purposes or not, undoubtedly a union of German and Russian forces has been effected for the development of commercial aviation, so that at present, the Deruluft Oukrvosduchput and Dobrolet companies are operating more than 4,000 miles of air lines.

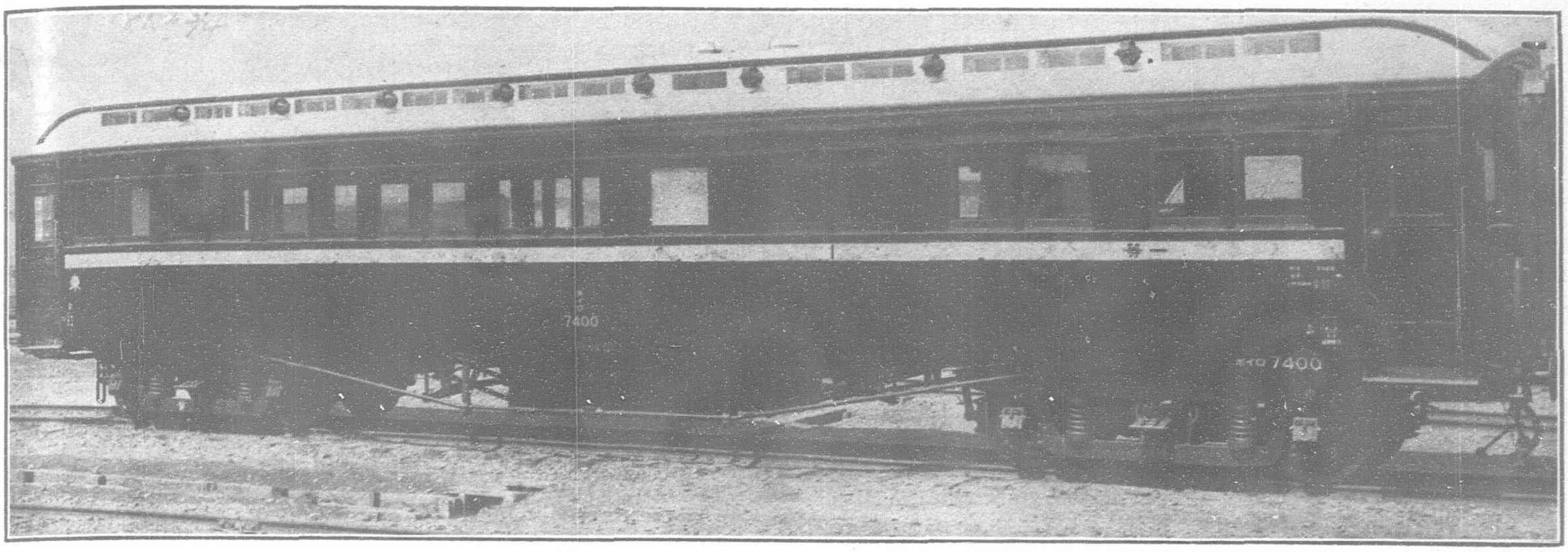
The Deruluft Company operates the 750 mile air line from Moscow to Koenigsberg from which connection is made with the German Luft Hansa to Berlin and on to Paris and London. The Oukrvosduchput Company operates the Moscow-Charkoff-Rostoff-Mineralyne-Wody-Baku-Tiflis 1,813 mile air line, which connects up with other lines in such a way that a passenger can fly from London to the Caspian Sea. The smaller Dobrolet Company operates three lines; the 334 mile air line from Kagan through Chiva to Taschuas; the 456 mile line from Kagan to Duschambe and the 375 mile line from Verchneudinsk to Urga in Mongolia.

The Russians are always looking towards the East and studies have been made for the establishment of a permanent air service clear across Asia that will connect Berlin and Moscow with Peking, Japan, Vladivostok and the Bering Straits. Several flights have already been made along the Berlin-Moscow-Peking route and arrangements have now been completed by the Russian-German company with the Russian Government for the establishment of the necessary airway, including airports, weather service, night beacons and radio connections. This will give the Russians a line entirely within their own territory as far as Urga and perhaps Kalgan.

This line forms an easy avenue or entrance into the goal beyond in China. The Russians intend to develop this route within their own territory where it cannot be influenced by outside nations. England to get to China will have to go around by the way of India a line twice as long as the Russian one, and a lot of it over lands and water outside her control and more difficult to maintain. The Russians believe that in any future emergency they will be able to throw an air force into Asia that will obtain decisive results long before England or any other nation is able to get there. The only possible check to Russia's ambitions comes from Japan. As it was in a military sense, so it must be from the aeronautical sense.



The three commercial air lines now operating in Russia. Berlin-Moscow line is flown daily. Other lines are flown three to four days a week, depending on the demand. Certain lines formerly took from one to two weeks by camel train, but now can be negotiated in two to three hours



Passenger Car, Japanese Government Railway

The Statistical Aspect of Railway Operation Methods

H. Stringer, B.A., A.M.I.C.E., late Government Railways of China

THE present position of British railways is unsatisfactory. For some years large inroads have been made on reserves to pay dividends, motor transport competition is becoming increasingly serious and the ratio of expenditure to gross receipts has risen from 83 per cent. in 1924 to 90.7 per cent. in 1926.

That comparisons are odious is unquestionable but that they are instructive is sometimes overlooked. In any case the contrast of vital railway operation statistics on which labour conditions have little or no bearing gives much food for thought when British railways are considered *vsi à vis* other countries.

Take the case of that most vital of all railway operation figures : average tons per train. The following table is illuminating :—

	Average tons per train.	Date	
Great Britain	135.35	July 1920	Cape Government Railways. 142 tons 1916
	123.52	March 1921	
	129.75	June 1925	
	124.00	June 1926	
United States	386.00	1911	
	409.00	1912	
	445.00	1913	
	708.00	1920	
	713.00	1923	
	772.00	1926	
India	189.00		
Japan... ...	128.00	1916	
	142.00	1918	
Germany ...	240.00		
Chinese Government Railways	257.00	1918	

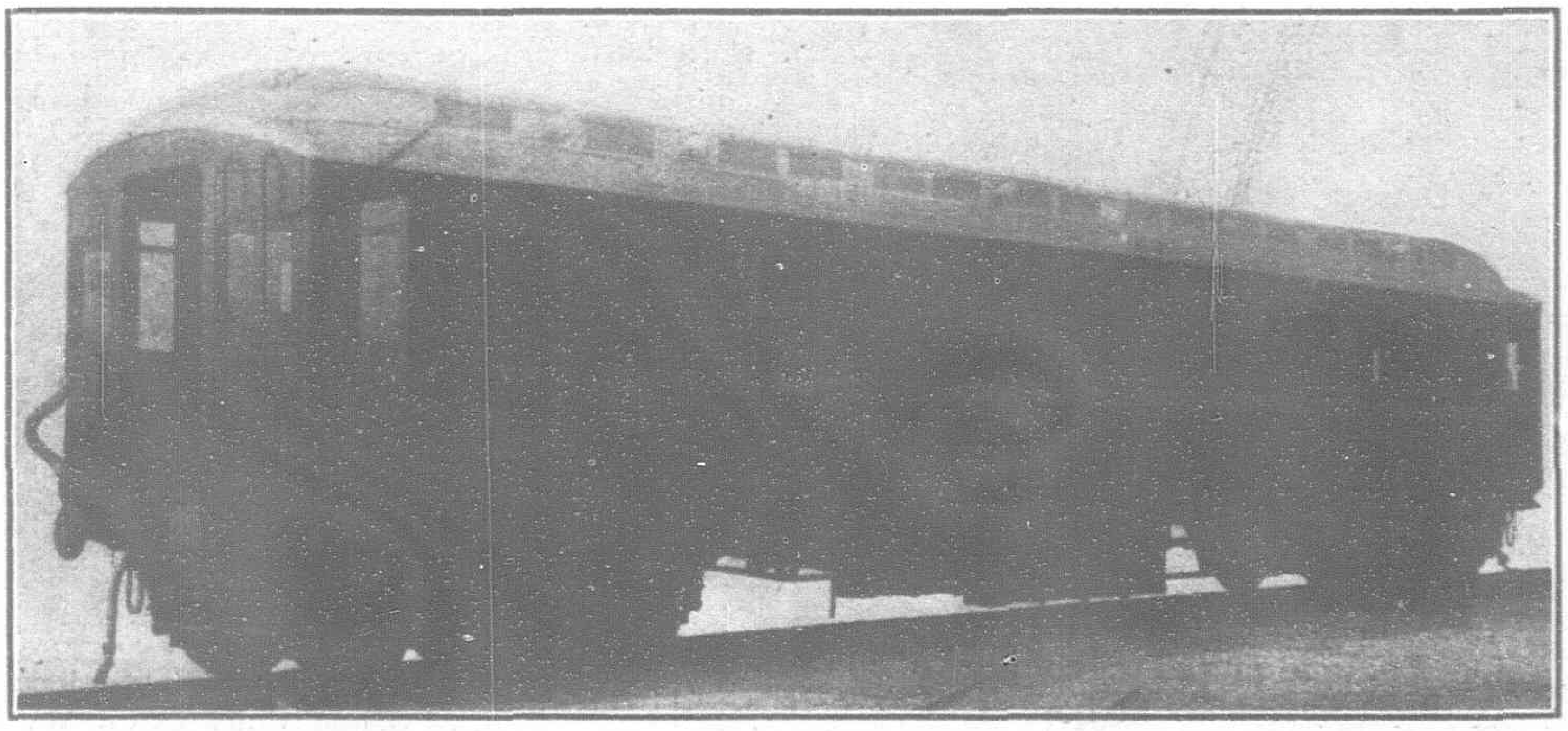
The striking fact here is that the British railways in this respect are to be classed below Japan, a narrow gauge country.

Tons per train is controlled largely by gauge, limiting gradients' rail weight, rolling stock equipment, empty wagon mileage and full loads when trains are run.

With regard to gauge, the railways of United States, Great Britain, China and Germany are standard 4-ft. 8½-in. with negligible exceptions. India has three gauges* 5-ft. 6-in., metre and 2-ft. 6-in., the various approximate mileages under each gauge being 18,000, 14,800 and 4,485, while Japan and South Africa have a 3-ft. 6-in. gauge with a considerable mileage of 2-ft. 6-in. and 2-ft. 0-in. gauge, the mileage of 3-in. 6-in. in Japan being 6,125 and that of the narrower 2-ft. 6-in. gauge 1,465, while the mileage of 3-ft. 6-in. gauge in South African Railways was 1916 8,899 and 2-ft. 0-in. gauge 520 miles.

The effect of gauge on train load for gauges of metre and upwards is slight for given the railweight locomotives can be designed to handle up to the full capacity of the rail, but for gauges below this conditions of stability and the necessity of limiting piston speed have a decisive effect on design which increased railweight cannot counteract. The most vital effect of narrow gauge is its effect on line capacity owing to lower speeds.

From the previous paragraph it will be observed that the British railways suffer no real handicap from the gauge question, and the same conditions obtained with regard to limiting gradient, the ex-European Railways in the list operating considerably heavier grades on their first-class lines. Thus in China limiting grades for easy country are 1 in 150 while in mountain districts 1 in 30 is allowed, two such mountain railways being included in the report for China from which the figure of 257 tons per train is obtained. Again Japan is hampered by a limiting gradient of 1 in 40 on important lines and also has to operate at least two rack sections, while the Indian railways are



Japanese Built Car

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*1915 figures.

handicapped by limiting gradient of 1 in 80 for the 5-ft. 6-in. gauge, 1 in 50 for the metre and 1 in 30 for the 2-ft. 6-in. Practically similar conditions are met with in South Africa where grades exceeding 1 in 40 are operated and 1 in 40 is the ruling grade throughout the country.

In the matter of rail weight the most vital factor after gradients in its effect on train load the British railways occupy an exceptional position, the 90 to 100-lb. rail being general and the 80-lb. rail rather exceptional for first-class lines. The railways contrasted have the following rail weights :—

United States	80 to 100 lbs.	85-lb. being general.
India	69 ,, 100 ,,	on the 5-ft. 6-in. gauge.
	50 ,, 41¼ ,,	on the metre gauge.
	30 ,,	on the 2-ft. 6-in. gauge.
Japan	60 ,, 70 ,,	on the 3-ft. 6-in. gauge.
Germany...	about 85 ,,	18-ton axle loads.
China	85 ,,	
South Africa	80 to 60 ,,	the mileage under 80-lb. rail being comparatively small while a 35-lb. rail is standard on the 2-ft. 0-in. gauge lines.

The effect of rail weight on train load is, of course, to cut down the allowable axle loads on locomotive drivers, thus limiting adhesion and haulage capacity. While it is recognized that there are other vital factors affecting average train load such as empty wagon mileage, gradients, etc., the following table for the three Indian gauges is unquestionably illustrative of this effect :

Railway	Rail weight	Train load
5-ft. 6-in. gauge.		
Bengal Nagpur	90	298
B.B. and C.I.	69	310
East Indian	85	317
G.I.P.	100	215.5
Metre Gauge.		
Assam Bengal	50	109
Bengal N. Western	50	113
B.B. and C.I.	41.25	137.3
Burma...	50	138.9
2-ft. 6-in. Gauge.		
Nagpur Chindwara	30	78.3
Kalka Simla	30	22.3
Trans Indus	30	25.2

The above figures are for the first half of the year 1917-8.

This table also sufficiently indicates the effect of gauge and rail weight on reducing the average train load for a country such as India with a considerable mileage of mixed gauges. Yet India as a whole shows a better average by over 60 tons than the British railways equipped to more or less uniform and infinitely superior standards. In the case of United States, Germany and China countries where equipment is more or less to British standards it will be observed that average tons per train is enormously in excess of that obtained in Great Britain. In the case of China* this average is reduced by inclusion of a metre gauge line operating traffic over a line equipped with a 56-lb. rail and having a limiting grade of 1 in 48. Yet the average of this line in 1918 was 105 tons per train.

The mileage of 2-ft. 6-in. gauge in Japan and 2-ft. 0-in. gauge in South Africa would also, of course, have a lowering effect on average train load.

The effects of train load of rolling stock equipment, empty wagon mileage, are so closely related that they will be dealt with as a whole.

Thus in the first place it is obvious that necessary equipment is limited by line capacity in the first place, that is number of tracks and if single tracks frequency of crossing places. Line capacity again is further limited by average speeds.

In this respect the British railways occupy a vastly superior position as practically all important lines have four tracks in congested districts with separate tracks for fast and slow goods, while single track mileage is almost negligible instead of being usual in the case of all the ex-European Railways considered. The British railways should therefore be in a position to cope with a vast traffic with rolling stock of a total car capacity, for tonnage offering, giving far less margin than the other railways considered for line capacity aside, England must be a country of conspicuously short hauls and average speeds should be considerably higher than lines in the majority of cases single tracked.

Further in the question of empty wagon mileage the British railways should be in a superior position to the railways considered, for they are neither faced with the peak load conditions of a grain country nor with the problem of dealing with traffic which at certain seasons of the year sets in a fixed direct direction entailing long return hauls of empty stock as there is no return tonnage. This results in enormous reduction in average train load for these return train miles are totally unproductive, whereas the direct opposite must hold in Great Britain with its vast import and export trade. There should in England be always a high proportion of return tonnage and average train-load should show this, which it certainly does not. The Percentage freight upon capacity hauled in Great Britain should be considerably superior to any of the railways under consideration. The table given below indicates just a fair efficiency.

Shortage of rolling stock might be alleged as an excuse for poor train load as in this case cars when unloaded must be hauled away at once wherever the demand is most immediate instead of waiting for a load in the immediate neighborhood. This, of course, is conducive of excessive empty wagon mileage with consequent reduction in train load. With plenty of return tonnage, as must be the case, no such excuse can be advanced.

Further, with conditions as above, number of loads per car per year or annual tons per ton of car capacity should be exceptionally high on the British railways if cars are unloaded with promptitude and demmurrage rates made sufficiently exorbitant. On the Chinese railways which are lamentably short of rolling stock and where the average haul for the system is 185 kilometers—115 miles—(the least being 67 kilometers and the maximum 310 kilometers) the number of loads per annum per car reaches the high figure of 75, the maximum being 204 for a short mineral line—45 miles average haul—and the minimum 31 for a line run at a loss. The time allowed for unloading on the Chinese railway is 12 hours.

In connection with freight stock operation and rolling stock equipment it is of considerable interest to contrast the equipment for dealing with traffic of varying density.

Country.		Goods Traffic Tons per mile	Trains† Per Day	Engines Per Mile	Wagons Per Mile	Average Haul miles.
Great Britain ...	1912	22,300	50.4	1	33.5	—
	1921 (March)	—	—	—	—	55.87
	1925	16,600	—	1.2	35.3	51.7
United States ...	1911	7,420	14.2	0.25	8.8	149
	1920	—	14.2	—	10.0	—
	1924	—	13.6	0.27	10.0	—
	1926	5,760 (57% mineral)				332
Bengal Nagpur ...	1918	3,675	24.9	0.27	8.06	305
Bombay Baroda...	1918	2,400	23	0.29	7.1	356
East Indian ...	1918	9,300	41.7	0.51	12.4	385
The above 3 Indian lines are 5-ft. 6-in. gauge.						
South Africa ...	1916	1,460	10	0.17	3.13	184
China	1918	5,320	12	0.037	2	115
Japan	1918	9,370	27.2	0.543	8.8	103

Country		Total Wagon Capacity Tons	Average Freight Train Speed	Number of loads per car per yr.	% Freight on capacity hauled	Average Capacity per vehicle tons.
Great Britain ...	1925	7,457,902	3.7	45	54%	10.2
United States ...	1920	98,342,666	10.3	19.2	—	42.5
	1921	—	—	—	63	—
	1923	—	10.9	—	—	—
	1924	104,148,002	—	20.0	65.1	44.5
	1926	—	11.9	—	—	—
Bengal Nagpur ...	1918	233,000	—	30	50	16.5
Bombay Baroda..	1918	176,000	—	19.8	44	18.7
East Indian ...	1918	592,000	—	25.2	44.7	17.0
South Africa ...	1916	547,185	—	24.6	—	20.6
China	1918	246,849	—	75	(est.) 36.5	23.0
Japan	1918	467,021	—	107.5	51	10.0

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*China's total mileage being only 3,465.

†This figure obtained by dividing daily train miles into mileage is for all classes of trains. Goods trains per day on the three Indian lines are 10.3, 8 and 17 while in China and Japan the figures are 6.9 and 14.

Number of loads per car per year is of course obtained by dividing wagon capacity by total tons carried per year, and from the above figures it is seen that annual number of loads on the British railways is 45, a very poor figure considering the enormous tonnage available and the short haul and very high line capacity of the British railways. This figure means that the average time for each car to load, unload and travel is 8.1 days, a figure indubitably capable of reduction, for as volume of traffic increases so should number of loads per car per year and the tonnage per mile offering on Great Britain railways is enormously the greatest in the World. The number of loads per car per year should be at least twice what is surmised when the exceptionally favorable conditions are considered.

While it is recognized that it is impossible to dogmatise without an exact knowledge of local conditions, the above goods stock statistics indicate that the Japanese railways are very efficiently run but that a higher capacity wagon as on the South African railway might be introduced with considerable economy. This is a reform which must be introduced sooner or later on the British railways. The following table indicates the percentage dead weight to capacity for various classes of British built goods coal wagon. Comment is superfluous. The average wagon capacity is 10.2 tons.

Capacity of Wagon Tons	Tare of Wagon Tons	Per cent Dead Weight to Capacity	
8	5.5	68%	
10	5.8	58%	
20	8.2	41%	
25	10.17	40%	
32	13.10	41%	Hopper wagon
40	16.7	41.6%	all steel.

Further, the low percentage freight on capacity hauled for China's railways is an indication of higher empty wagon mileage as the result of inadequate rolling stock while the small number of loads per year on the Indian railways appear to indicate over equipment in spite of the very long hauls.

The question of what is adequate or inadequate in the matter of rolling stock is a particularly thorny one, but it would appear that it should be considered from the following point of view. Thus, take the case of a line equipped with a 60-pound rail, single track with crossing stations at 5-mile intervals and with a limiting grade of 1 in 120. Goods trains on such a line would not exceed a car capacity of 400 tons, and if we assume that freight is 50 per cent. of capacity hauled, tons of freight per train should be 200. Then if the average length of haul is 100 miles, each 100 miles of line should be equipped with a car capacity of 400 multiplied by the number of necessary trains obtained by dividing the daily tonnage available by 200 tons. This number of trains is of course limited by line capacity, which is, say 32 goods trains out of a daily total of 36,—four being passenger trains—for a single line as above. Thus the maximum daily capacity of a single line as above is about 6,000 tons per 100 miles, and for this 12,000 tons of car capacity is required or four 30-ton cars per mile. Passenger stock can be treated on the same basis with an assumed relation between seat mileage hauled and seats occupied generally about 25 per cent. For hauls over 100 miles * these figures for car capacity must be proportionately increased as this is assumed to be the limit of daily motion for rolling stock, a figure which excessive demurrage rates (to ensure speedy loading of empty stock) might do much to increase. Further this neglects stock not in motion.

All that can be surmised from the very favorable conditions under which British railways are placed in the matter of gauge, rail weight, line capacity, short haul, etc., is that trains are either not loaded to capacity, or that empty rolling stock is unnecessarily moved, or again that there is excessive delay in loading or unloading stock. If the need for rapid transit of goods is conducive of running trains which are neither loaded to full capacity of stock hauled nor to the hauloge capacity of the locomotive then those interested in railway transport should be called upon to bear one more hardship, that of running business on larger stock or paying higher rates. When it is recollected that mineral traffic, in a country where such output is over 200 million tons annually, must form a very high proportion of the tonnage hauled it is obvious that private wagon ownership, which is somewhere in the neighborhood of 50 per cent. of all goods stock, is at the root of much of the trouble and this must be eliminated.

The question of rapid loading and discharge for mineral traffic can be dealt with by the introduction of the high capacity hopper wagon with high level facilities for bin discharge, while for handling small consignments the introduction of fast electric travelling cranes of the gantry† type spanning several sidings should surely be feasible. Further it would appear to be advisable to throw the onus of collection and delivery perhaps even discharge and loading of cars on transport companies or even consigners or consignee.

Other obvious reforms applicable to all new work and renewals are as follows :—

The substitution of the flat footed for the bull head rail. With the 90-lb. 30-ft. rail with 12 sleepers under, this would effect an economy in chairs of 90 tons of cast iron per mile valued at at least £1,300 $13,000 at the present price of pig iron.

The introduction of the high capacity wagon for reasons previously detailed and for the economy effected in shunting and marshalling, etc.

The introduction of the Janney or other automatic coupler which would eliminate much of the risk incurred by shunters‡ and facilitate more rapid movement of cars. Further this reform would render feasible the introduction of the continuous brake for all stock, another change making for increased speed and safety of operation.

As regards personnel the following table provides a contrast :—

Country	Year	Employees per mile			Employees per 100,000 train miles	Trains per day
Great Britain§ ...	1912	Total 26	P.W. Dept.	2.83	147	48.5
	1924	34.4	,,			
	1925	35.2				
Canada	1915	,, 3.37			119	
United States... ...	1916	6.25	,,	1	128	14.2
	1925	7.5				
	1926	7.7				
France...	1912	13.9			139	
India	1915	17			382	
Japan	1918	20.8	,,	3	213	27.2
China	1918	18.5	,,	6.1	435	12

These figures seem to indicate that there is room for economy if we contrast the figures for the United States and Great Britain making allowance for the greater traffic density. The superiority of the United States is without doubt due to the use of machinery to a greater extent than is customary with us, a remark perhaps still applicable to most of our industries. This consideration apart it would appear that considerable reduction could be made in the Permanent Way Department.

With regard to Locomotive performance the following statistics indicate no bad performance for the British lines

Great Britain	1914	25,300	miles per locomotive per run.
United States	1914	27,300	do.
Japan	1915	26,600	do.
China	1918	29,700	do.

Other minor reforms which would effect considerable economy are the institution of the Pullman car system giving much greater seating capacity per passenger car. Another necessary innovation capable of expansion should be modern coaling plants on the hopper system for fuelling engines.

For those opponents of the principle of nationalization of railways the following facts are presented in refutation of the fact that absence of competition is conducive of inefficiency and stagnation.

The Japanese railways were nationalized in 1906 when the total mileage was 4,371 miles. The mileage was in 1916 just under 6,000 miles while enormous betterments have been carried out in the interval. Passenger traffic has more than doubled itself and the cost of transport has fallen, while goods traffic is more than

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*This figure a probably correct assumption for double track lines but should be much less for single track lines. Thus the daily movement per wagon on the Japanese railways in 1918 was 58 miles only. In England it is 15 miles and in the United States of America it was 25.1 in 1920 and 30.4 in 1926.

†This would only be applicable to loading open cars.

‡In 1910 1 in 553 shunters employed were killed and 1 in 10 injured. The total shunters employed was 13,381.

§British mileage is practically stationary while that of the United States increases at an average of 400 miles per year.

four times its original volume, also with a considerable fall in rates as well. Rates have fallen as follows :—

	Year 1906	Year 1916
Passenger fares	Yen 0.0155 per mile	Yen 0.0134
Goods rates	„ 0.0199 per ton mile	„ 0.0166

In other respects the following statistics indicate at least that government control has done no harm :—

Year 1906	Average total load per goods wagon	7.1 tons.
„ 1916	do.	9.9 „
„ 1918	do.	11.6 „

Year 1906	Average load per train	71 tons—Number of cars	20
„ 1916	do.	128 „ — do.	28
„ 1918	do.	142 „ — do.	28

The above figures speak for themselves.

Again the government railways of China were uniformly and increasingly prosperous up to the year 1918 in spite of the fact that the system of foreign loan agreement, under which the railways have been constructed, tends towards uneconomic de-centralization and plurality of officials. There are for instance in a system totalling 3,465 miles 14 separate administrations ascribed mainly to this cause yet the return on capital invested was 10.9 per cent. for the year 1918. The Peking-Mukden Railway, the nucleus of the system, has paid dividends of the order of 20 per cent. since 1905. Since 1918 continued war and military interference during the short periods of quiescence have ruined the entire railway system.

The system of nationalization has also been applied to the railways of South Africa. They are solvent and pay dividends which have risen from just over 3 per cent. in 1914—a slump year—to just under 5 per cent. in 1916, which is a better return than that provided by British railways.

Unquestionably nationalization would eliminate much competitive and wasteful construction, it would do away with traffic canvassing, and reduce enormously the cost of advertisement while considerable economics could indubitably be effected in personnel. Thus there is very little question that the numerous privately owned stations serving each of the great cities of the country are an extravagance as much now as when built, for they occupy much wanted land and must be very costly in the matter of interchange traffic. There is little question that they would never have been allowed under a centralized control.

The great benefit of nationalization would be the introduction of co-operative working between the railways and the common use of rolling stock. The system of private wagon ownership must be eliminated for efficiency of working and economy of national capital. Further there is unquestioned need of centralized control of routes to be followed and ports of destination to ensure economic distribution of work for the railways and the avoidance of unnecessary congestion.

Under the stimulus of a Great War we are said to have revolutionized our industries and we should do well to immediately follow the American example of 1866 and apply the same process to the railways. Since that date though there have been set back as when the United States Government acquired control of the railways during the War period, there has been a continuous upward trend in railway operation efficiency. The following table of performance ratios for the United States railways indicates that the slackness which was characteristic of War Management, which ceased in 1920, has been tackled and eliminated :—

Freight Service Performance		*1925*	*1924*	*1923*	*1922*	*1921*	*1920*
Freight car-miles per car day ...		28.3	26.8	27.8	23.5	22.4	25.1
Net ton-miles per car day		493	471	510	424	389	498
Net tons per loaded car		27.0	27.0	27.9	26.9	27.6	29.3
Net tons per train		744	715	713	676	651	708
Gross tons per train (exclud. locom. and tender)		1670	1588	1539	1464	1435	1443
Freight cars per train		43.8	41.7	39.9	38.4	38.4	36.6
Freight train speed (Miles per hour)		11.8	11.5	10.9	11.1	11.5	10.3
Freight locomotive-miles per locomotive day		58.2	55.3	60.3	52.0	49.5	65.3
Net ton-miles per train hour ...		8773	8222	7770	7479	7506	7302
Gross ton-miles per train hour (exclud. locom. and tender) ...		19679	18257	16764	16188	16555	14877
Fuel consumption per 1,000 gross ton-miles (exclud. locom and tender) ... ...lbs.		159	170	183	186	185	197
Passenger Service Performance.							
Passenger locomotive-miles per locomotive day		110.3	108.5	108.6	101.7	103.4	116.6
Fuel consumption per passenger train car-mile ... ...lbs.		16.1	17.0	18.1	17.9	17.7	18.8
FINANCE.							
Operating Ratio	%	74.1	76.2	77.7	79.3	82.6	93.7
Rate of Return on Investment	%	4.85	4.33	4.48	3.61	2.92	0.09

As a nation Great Britain is slow to employ drastic methods, the case for war to the Knife against the private wagon owner appears to be fairly well established.

Without railway efficiency our industries cannot be thoroughly efficient ; coal and transport are the life blood of a country.

Making Sponge Iron from Ferrous Sand in Japan

AN attempt is being made in Japan to utilise the large deposits of ferrous beach sand extending for about 70 miles, and averaging about 18 ft. in thickness, near Kuji, on the eastern coast of Japan, about 100 miles from the northern point of the main island. One estimate, made by Government engineers in 1921, placed the total of such sand in one area of 22 sq. km. at 150,000,000 tons. The most conservative estimates give the entire area a minimum of 200,000,000 tons of ore. Others state that the field could fill Japan's present requirements of 2,000,000 tons of iron a year for several centuries.

The prosess, which has recently been put into operation at the Kuji Iron Works, consists in the reduction of the common oxides of iron—hematite, limonite, magnetite and the residues from the roasting of iron pyrites—at a temperature low enough to prevent the melting of any of the iron or other constitutents of the iron ore. This temperature lies between 500 and 1,000 deg. C. No flux is used.

The beach sand is charged continuously through pipes to an annular hearth or sponge-iron furnace. Coal, which has been partially distilled to drive off moisture and light volatiles, is charged with the beach sand in the approximate proportions of one part of coal to four parts of beach sand. The annular hearth rotates slowly and heat is applied from 72 carborundum tubes installed immediately above each hearth. Gas is burned in these tubes, but the waste gases do not mix with those formed over the rotating hearth so that there is no danger of exoxidisation of the particles of iron after they have once been reduced to the metallic state.

The rotating hearth is 12 ft. wide. As ore and coal pass across it they are mixed and the iron oxide is reduced to metallic iron. The particles of iron are the same size as the particles of ore. The time required for the charge to pass across the hearth is about 30 min. The finely-divided metallic iron, together with the waste material in the original beach sand and the excess coal, is discharged continuously into revolving cylinders, rotating in water to cool the material to atmospheric temperature, to prevent the finely-divided iron quickly burning back to iron oxide, which would occur if the temperature of discharge were too high. This cooled material is then passed over magnetic separators, where the metallic iron (and a certain proportion of ilmenite, which is magnetic), is separated from the waste material. The ilmenite which is carried over reduces the grade of the iron somewhat. There is no particular disadvantage to this other than that the ilmenite must be charged into the melting furnaces later.

The finely-divided iron, commonly known as sponge iron, is then briquetted in special presses at 40,000 to 50,000 lbs. per sq. in. pressure, the resulting briquette having a density about 75 per cent. of that of solid iron, permitting it to be charged directly into open-hearth furnaces and insuring the sinking of the briquette below the slag line. The temperature of the reduction is sufficiently low to prevent the reduction of phosphorus from its mineralogical compounds and thereby eliminates one of the most troublesome ingredients in many iron ores. The low temperature also prevents the reduction of titanium from the ilmenite, a feature considered highly desirable in the Kuji process. The result is a very pure wrought iron with no combined carbon present and without combinations of phosphorus or titanium. In order to make steel, sufficient pig-iron is added to produce the grade of steel desired. There are two furnaces, each capable of producing 50 tons of sponge iorn per 24 hours.

Experimenting with Buses in China

The Story of a Prospering Transportation Business in Shanghai—Problems, Accomplishments and Prospects for Motor Communication in the Flowery Kingdom

By H. F. Wilkins

THE trials and tribulations of motorbus operation in China offer one of the most interesting economic studies of the age. Many who know the situation in the trammeled interior of China say that the greatest need of all is for a means of quick and cheap transportation. It must be quick to compete with wheelbarrows, Peking carts and various mediaeval devices to which China still clings. It must be cheap so that the poor Chinese can use it, or else it would not pay.

The motorbus, which in America and England has enjoyed in recent years the most phenomenal growth ever experienced by any form of communication with the possible exception of the airplane, seems to be the logical solution to China's passenger transportation problem. But there is another side to the difficulty. To run properly and comfortably, a motorbus needs a road to run on, and China has almost no roads at all.

One of the Largest Garages in the East—the Depot of the China General Omnibus Company in Shanghai

Such roads as have been built in China owe their existence largely to bus lines already established successfully in the provinces. At the end of 1926 there were 26 such bus lines located in Kiangsu, Chekiang, Shensi, Kwangtung, Fukien, Hupeh, Anhwei, Kiangsi, Kwangsi, Chihli and Szechuan provinces. These are all short line routes operating Ford buses with special bodies designed to withstand the pounding of primitive roads and the disgraceful treatment of untrained coolie drivers. Since that time many of these have died and new ones sprung up in their places, but the number is approximately the same, with possibly a slight increase.

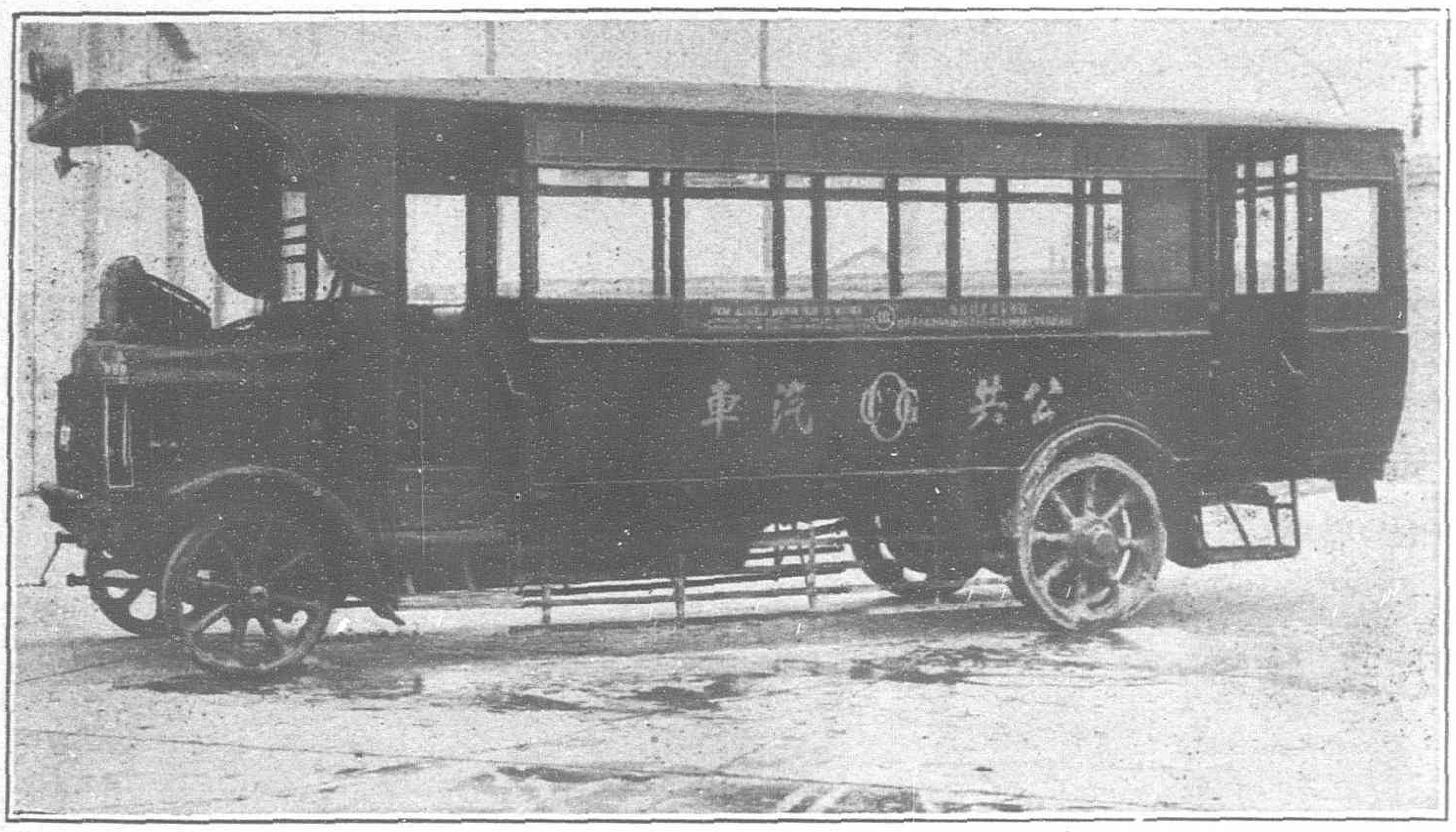
According to the *Chinese Economic Bulletin*, a Chinese government publication containing economic information, the development of motorbus service in China has been the result of road building throughout the country. But it would be just as accurate and more prophetic to say that road building has been the result of the operation of motorbuses. The tremendous profits of short line operation are readily appreciated by the more forward-looking Chinese, and these are the men who are pushing road building to-day, with the material assistance of foreigners connected with the National Good Roads Association in Shanghai, an organization started in 1921 when there were only about 300 *li*, or 100 miles of improved roads in all China outside the foreign concessions and leased territories. Since this organization began work there has been a tremendous improvement, but the work yet to be done dims into obscurity that already accomplished.

Building roads and operating bus lines in the interior of China is one thing, and establishing and operating a modern bus system in the great International Settlement of Shanghai is something else again. The two problems have some elements in common, however, and a study of the urban situation where accurate information is more readily available throws some light on what may develop in future years when a network of roads covers the interior of China.

The China General Omnibus Company, Ltd., incorporated in Hongkong, was established in Shanghai in October, 1924, with a capital of Taels 703,000 or about $527,000 in American money. Arnhold & Company of Shanghai are the business managers and promoters. This company brought to Shanghai a fleet of Tilling Stevens Petrol-Electric buses from Maidstone, Kent, England. These buses are still in operation, but they are to be gradually replaced by a new type of modern bus of which the first shipment has just recently been installed.

In its first stages of operation, nearly four years ago, this bus system was intended to handle, and did handle, only the foreign and the better class of Chinese trade. It carried the slogan "A Seat For Every Passenger," and lived up to it with a vengeance. The way it turned out, there was far more than a seat for every passenger. The new company was up against a problem that belongs peculiarly to China. Their prices were too high and buses plied their routes with a dearth of passengers.

To keep out the lower classes of Chinese, fares had been boosted up into the silver class. That is, only silver coins were accepted in payment; no coppers. The maximum was 25 cents, local currency. Passengers were not prepared to pay for riding in comfort. The classes for whom the buses were intended failed to use them. There was only one alternative if the company was to continue operation. Prices must be brought down to the copper level. A Chinese copper is worth about a quarter of an American cent. The fare rate in Shanghai works out at 7 miles for 40 coppers, or about 1.1 cents American money per mile. This is pretty cheap transportation. A Chinese can travel about 100 miles on a bus for an American dollar, or about 43 miles for one of his own Mexican dollars. Tokens are issued in 5 cent and 2½ cent denominations.



One of the Newest Type of Bus here, the Body Made in Shanghai

These are used largely by foreigners. The Chinese pay their fare in copper which they carry about in a small cloth or leather pouch with a shirred top and a string on it.

This present fare rate is profitable in Shanghai. The buses ply Shanghai streets usually with passengers standing up and all the seats full. In rush hours they are crowded to capacity. One of the Tilling-Stevens buses seats 24 passengers and admits 22 more to standing room. The new type of bus seats the same number and has standing room for 20 persons. The company operates at present 52 buses, including the old and new types, on five different routes, one of them just recently established. The longest route is about seven miles, and the shortest less than two miles.

The petrol-electric buses have proved very staunch in their four years of operation. The main reason for replacing them with the new type is their rough treatment of paving surfaces. They carry non-pneumatic tires. Their mechanical operation is simple. An electric motor of 40 horse power drives the rear axle by direct transmission. The 40 horse power gasoline motor is geared directly to a dynamo which furnishes the electric motor with power. There are no storage batteries except a small unit for lighting. In operation the petrol-electric bus looks and sounds exactly like one of its all-gasoline brothers.

The new buses are the last word in British construction and are similar to those now being supplied to Britain and her dependencies. They are low-loading, drop-frame buses manufactured by Guy Motors, Ltd., of Wolverhampton, England. They are gear driven, gasoline consuming, with Dunlop pneumatic tries, the rear wheels carrying twin tires. The engine is light but of robust construction developing 38 horse power at 1,000 revolutions per minute. Transmission is from the engine through a cone clutch and a four-speed and reverse gear box.

Four-wheel brakes are provided. The foot brake works in conjunction with a servo-vacuum motor which multiplies the brake pressure of the driver's foot five times. The driver's seat is by the side of the engine, enclosed in a weather proof cab which in these models is carried across the front of the radiator. The seating arrangement is similar to that in the petrol-electric cars, but the seats are rather more roomy and more comfortably upholstered.

The particular feature which attracts attention is the low-loading facility. A single step 15 inches from the ground expedites loading and unloading and also gives a very low center of gravity. The interior of these new cars is handsomely fitted in comparison with the old ones.

As an experiment, two of these new buses were shipped out from England in crates 25 feet long, already set up and ready for operation. As a matter of fact they were unloaded at the jetty and run up to the bus depot under their own power. Eight of the bodies used on the old type bus were built in Shanghai. The rest were shipped out from England in knocked-down form. It is probable that future shipments will be made in this manner. The new Guys buses weigh seven tons and the others nine tons.

The company's headquarters and shops are located on an outlying road in the International Settlement. A passenger depot is not necessary for a purely urban system. A big garage is provided and the main shops are under the same roof. Every bus in the system is thoroughly gone over and tested each night for engine trouble, brake trouble or anything that might hold up the service next day if not attended to. At regular intervals each bus gets a thorough overhauling, and the regulations are so timed that two buses are in the shop for overhauling all the time. The cars are taken down from radiator to rear axle, cylinders ground, valves ground, bearings inspected, motors and dynamos rewound and gears examined. The shop employs Chinese labor with a few Russian mechanics mixed in, and the shop system is being worked down to a point where in a few months a bus can be brought off the line and completely overhauled in 48 hours' time.

At present the company employs about 450 in the shops, on the routes, and in the offices. Drivers, conductors and inspectors work on two shifts, four hours at a shift. The proportion of inspectors to conductors is far higher than in the ordinary bus community, with about one inspector on duty to every four buses running at any given time. The inspectors are mostly of Korean nationality, and are regarded as more trustworthy than the Chinese of the same class. An inspector boards a bus at a definite point and hour, inspects passengers' checks and initials the conductors' waybills. As a countercheck conductors also must initial the inspector's checking sheet.

Conductors are specially and efficiently trained in the matter of getting the most out of their routes. Their salaries are slightly higher than those of tramway employees, and in addition they get a bonus at the end of the month, based on the number of passengers from whom they collect fares. This is by no means an invariable factor, they are taught. A conductor with the aid of his driver can materially increase the profits of his route by stopping the car at route stops and not merely waiting for possible delayed passengers but getting out and looking around for them. In primary stages of operation, the drivers were prone merely to slow up at stops where no passengers were unloading, unless somebody hailed them for a ride. One lesson in the course of education parceled out to the conductors and drivers is that if each bus misses only one passenger par trip it means 1,000 passengers a day.

In the office an interesting experiment has been carried out on the relation of weather and temperature in China to consumption of gasoline and lubricating oil, A big chart was kept up to date, starting about a year ago, recording each day the temperature, the kind of weather and the amount of gasoline and oil consumed by the fleet. It is apparent so far that temperature makes a great deal of difference in the amount of fuel used. Shanghai has an unusually great range of temperature from summer to winter—approximately 100 degrees from coldest to hottest. The fleet

One of the Largest Buses in use by the China General Omnibus Co., in Shanghai burns much more fuel in cold weather than it does in the summer time, and it uses correspondingly more lubricating oil. The condition of the weather seems to make little difference. Buses burn no more fuel in wet weather than on fair days. The experiments are continuing, and when figures are gathered representing two or three more years of operation they will yield some scientifically accurate information which should be of value abroad as well as locally.

Such is the *modus operandi* of a modern bus system in the city of Shanghai. It is a different story out in the provinces. Shanghai streets are paved as smoothly as Broadway or Fifth Avenue in New York, perhaps more so. Provincial thoroughfares are primitive where they exist at all, and about as easy on a motor car chassis as a corduroy road in a lumber district. Nevertheless bus transportation, where it has been established, is extremely profitable for its promoters. A trip for instance that might take two days *via* the age-old Peking cart (one of the most uncomfortable methods of transportation ever invented) can be made by a bus in half a day, or a round trip in less than 12 hours where navigable roads are established. Such a trip by the old method would cost the traveler $4, including a night's stopover at a dirty inn. A bus company can charge the same rate per passenger, fill the vehicle to overflowing and make one trip a day each way. The possibilities are tremendous. Other difficulties besides roads intervene however in China's present state of turmoil. Any member of the military takes it as his given prerogative to ride free, and likely as not he enforces his privilege with a bayonet. The country is so full of these free riders that many bus companies have been forced out of operation. Soldiers have been known to turn a bus load of passengers out in the road so that two or three of them can have the place to themselves. Worse, many machines have been confiscated and wrecked when they had served their purpose for the time being in the hands of lawless army privates.

But far sighted observers in China know that this situation won't last forever. Meantime considerable progress is being made in the matter of road construction. China's condition relative to roads and transport is far from hopeless. She has the nuclei of a vast system of roads, and her past has shown a genius for construction combined with a sense for the need of communication. Most of the motor roads existing in China to-day are in the north, around Peking and Tientsin. A fine paved road runs between these two cities and a bus line competes here with a fine and regular railroad service. It is by means of motor transport that the only line of communication across the Gobi desert exists, and trade is carried on regularly between Kalgan and Urga, Urga and Chita and Chita to Hailar and Manchouli by trucks and converted passenger cars, flivvers and motor vehicles of every description. The topography of the northern country is different from that in the Yangtze River valley. In the south and particularly in central China, the landscape is crisscrossed by a network of canals and tiny waterways on which junk traffic plies from dawn to dark. It has been estimated that to build a road out west of Shanghai it would be necessary to build 18 bridges per mile of road construction. The Shanghai-Nanking Railway had to meet this obstacle. So did the Nationalist government in building military roads in the region of Nanking and Hankow. It can be done.

South China, in the region of Canton and Hongkong, has made good progress recently in the matter of road construction. Kowloon, ten minutes by ferry from Hongkong, has one of the finest motor roads in all China and a modern urban and suburban motorbus and taxi system. Consequent real estate development is making Kowloon a most desirable residential suburb of Canton. The city of Canton itself has grown away from the traditional idea that roads must be narrow and crooked and now has some fine, wide, well-aligned paved streets. Yunnan province, down in the far south-western corner of China, has under way at present a $300,000 road building program. Well graded earth motor roads are reaching out from the capital, Yunnanfu, to the south and west. Funds for this work were provided by the Famine Commission when it was decided that this relief measure, the construction of roads, would be the wisest possible move. Good communication facilities will prove the first help in solving the problem of getting food to the masses in times of stress.

It has been said that potentially China is the most promising place in the world for communications and that granted peace in civil affairs for a generation she will astonish the world. The reason why China has no roads to speak of at present in comparison to what the country needs is not far to seek. It is all because of the wheelbarrow, which has been for centuries the favored and only means of transporting both human cargo and freight in the interior as a land vehicle. A wheelbarrow needs nothing more than a path to run on, so the Chinese found no necessity to build roads wide enough for even a cart. China's present predicament in the matter of roads is owing more to reactionary sentiment and economic conditions than to any physical difficulties in the way of road building. The sentiment is changing and economic conditions will yield to modern inroads on ancient practise as time goes on. The growing movement for demolition of city walls all over the country shows that. Somebody has remarked, probably having in mind the Great Wall of China, that if in the past emperors had built roads instead of ramparts, what difference would there have been in the history of the country!

Bus transportation is the logical solution to China's communication problem from the passenger standpoint, and the few bus lines that have been successfully established have been material factors in bringing the Chinese to a realization of the need for road building. It is safe to say that the motorbus will play a major part in one the most interesting economic experiments of all time—bringing a nation of 400,000,000 people up to date in the face of phenomenal advances in civilization in standards of living in western nations.

Thornycroft (Singapore) Ltd.

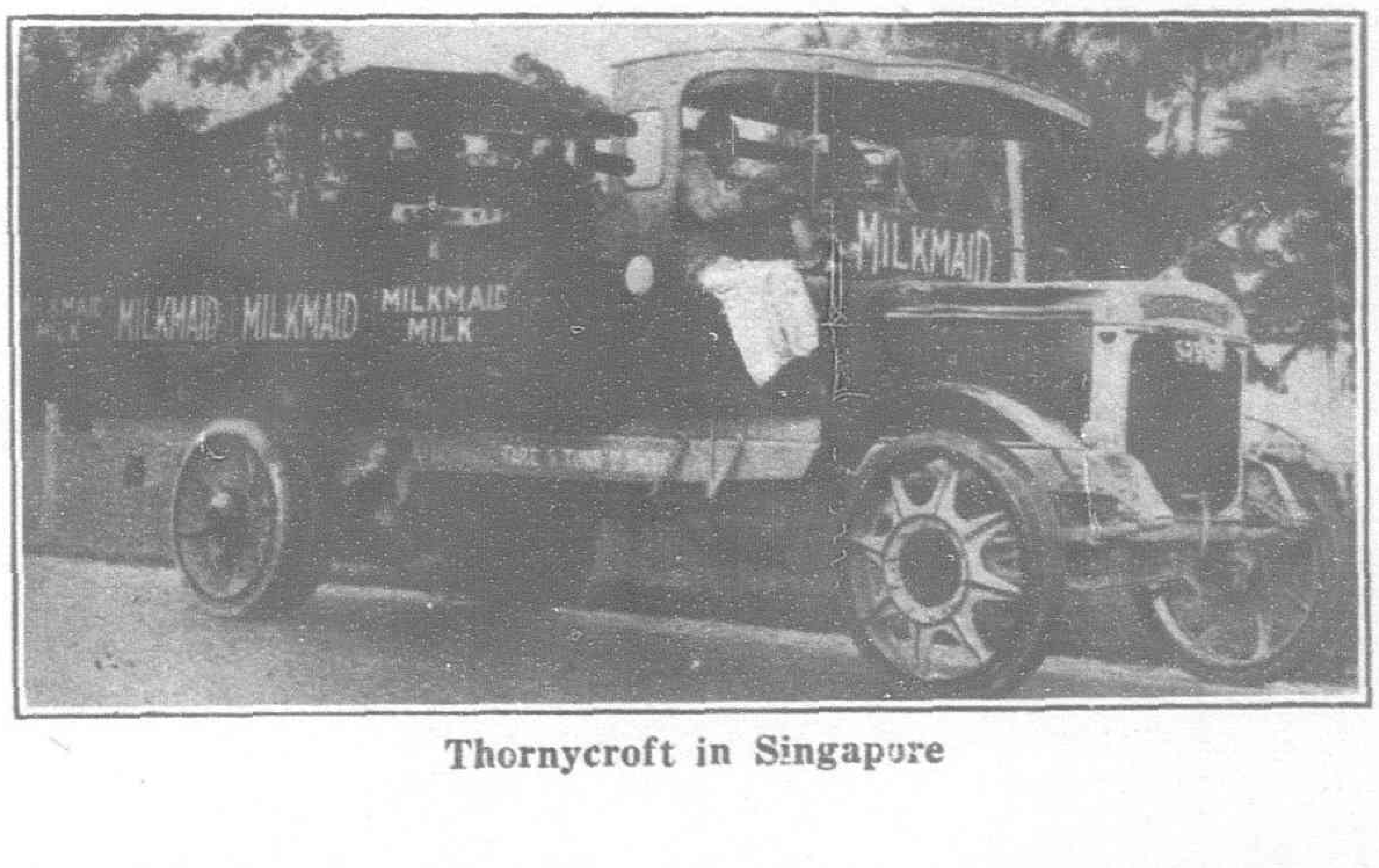
At the recent Annual Meeting of the shareholders of John I. Thornycroft & Co., Limited, the interesting announcement was made public of the recent successful formation of Thornycroft (Singapore) Limited to take charge of the Company's increasing interests in Malaya and the Near East.

The parent company has, of course, a substantial financial holding which appeared for the first time amongst the Balance Sheet Investments which is in keeping with their overseas policy in China, Australia, Canada, Brazil, etc., where subsidiary companies have been formed and are making good progress in these markets for Thornycroft productions.

The accompanying illustration is evidence of the increasing use of Thornycroft motor vehicles in Malaya, illustrating as it does one of two of the latest type "Q" 6-ton vehicles recently delivered to the Anglo-Swiss Milk Company, Ltd., of Singapore.

This is also a very active market for Thornycroft marine engines, and the new company will undertake the building of all types of motor boats to Thornycroft designs, suitable for their wide range of engines.

The new company, as heretofore, will be in charge of one of Messrs. Thornycroft's own trained staff, whom they sent to Singapore several years ago and whose very successful efforts have resulted in the formation of their new subsidiary concern.



Thornycroft in Singapore

Manchuria's New Railways

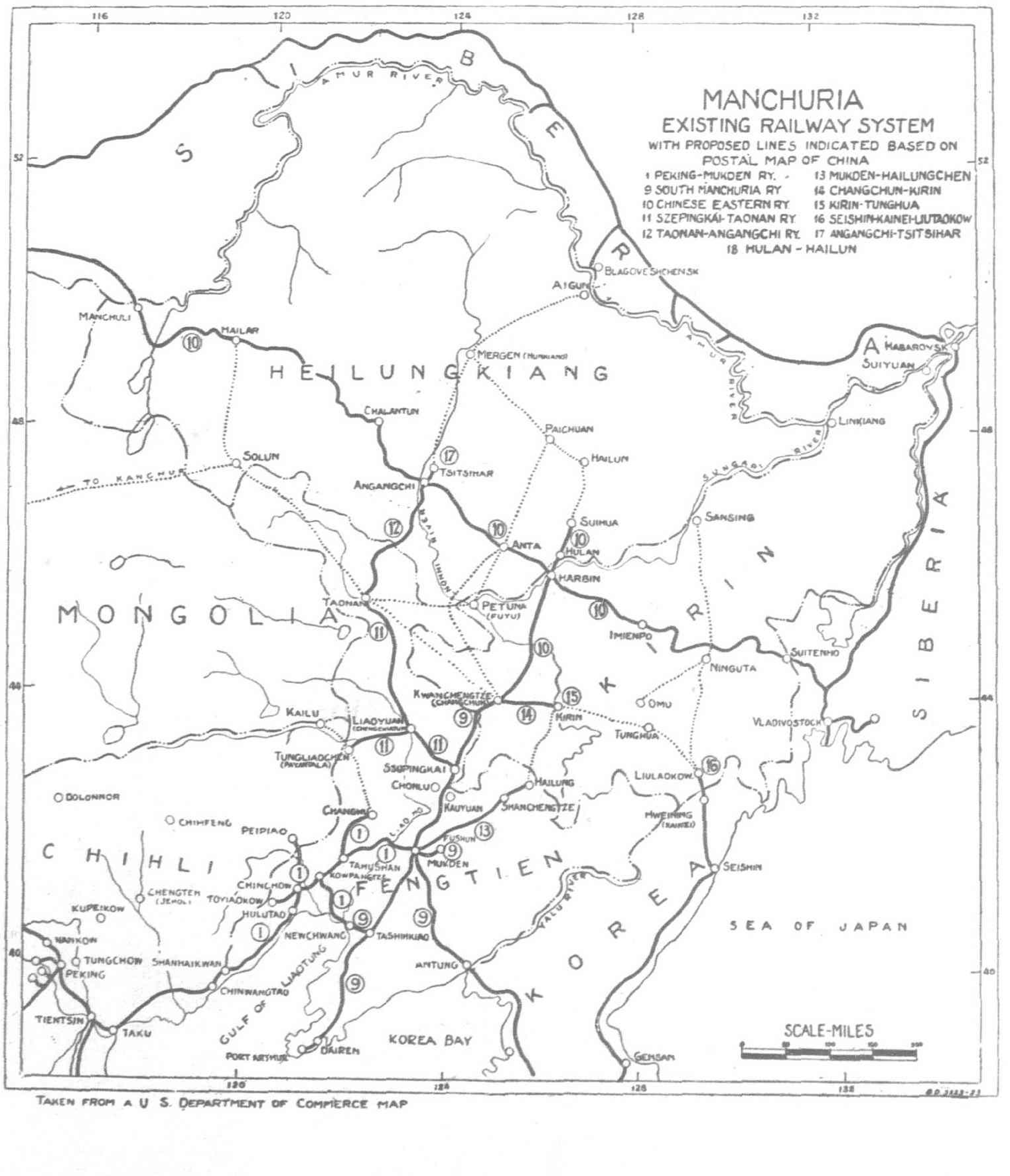
Five Important Railways Constructed or under Construction in the Past Two Years—New Lands Opened up for Economic Development and Settlement by Chinese Immigrants from Southern Provinces

Charles K. Moser, Chief, Far Eastern Section, Division of Regional Information

THE immense tide of Chinese immigrants pouring into Manchuria from the more southern Provinces, and the outstanding prosperity of the region as contrasted with the economic disorder prevalent over the rest of China, have served to bring again to the attention of the western world the remarkable program of railway expansion that is taking place there. While railway development in China proper stagnates, three nations—China itself, Japan, and Russia—are displaying exceptional activity in the construction or planning of new Manchurian railroads.

Most of the lines projected, or in course of actual construction, have been planned to open up the lands they are to traverse for economic exploitation and settlement by the new colonists; but the possibility of advantages other than economical has not, in some instances, been overlooked.

Manchuria embraces the Three Eastern Provinces—Fengtien Kirin, and Heilungkiang—in an area of over 265,000 square miles. Its soil generally is of almost exhaustless fertility and it possesses immense potential resources in agriculture, timber, and mineral wealth. In 1920 the total production of north Manchuria alone was estimated at a value of $320,000,000. Soya beans, wheat, millet, and kaoliang are the principal crops raised, but the cultivation of sugar beets and the breeding of livestock are of growing importance. While industrially undeveloped as yet, there are in the larger cities modern flour mills, bean-oil mills, soap works, sugar refineries, sawmills, distilleries, breweries, glass factories, and tanneries. Although the population of Manchuria constitutes but 6 per cent. of the population of China, in 1925 Manchuria's total trade constituted 30 per cent. of the total Chinese trade.



TAKEN FROM A U S. DEPARTMENT OF COMMERCE MAP

Railway Development Attracts Vast Colonist Movement

Thirty years ago Manchuria had no railways and its population was less than 2,000,000. To-day its railways total nearly 4,000 miles—about as much as the whole of the rest of China—and the population, according to recent estimates, numbers over 27,000,000. Railway development has brought into Manchuria probably the greatest colonization movement that has ever taken place in history, in an area of similar size and in a similar length of time. In one month, March, of the current year approximately 200,000 Chinese immigrants passed through the port of Dairen. Hitherto the movement has averaged around 400,000 immigrants per year, but for 1927 it is believed that the total influx will reach 1,000,000, 15 to 20 per cent. of whom are women and children. These are permanent colonists.

Railway construction in China at present is practically confined to Manchuria. Military activities and political uncertainites, combined with lack of funds, are the retarding factors. In Manchuria, on the other hand, at least five principal lines have been in process of constuction during the past two years.

Among them one of a perhaps purely economic character is the Hulan-Hailun Railway, commonly referred to as the Hu-Hai line. From Sungpu, on the Chinese Eastern Railway and directly across the Sungari River from Harbin, this road runs northward through the fertile valley of the Hulan River, one of the richest wheat-producing areas of Manchuria. It has now been completed through Hulan to Suihua, a distance of 70 miles, but the work is being extended 50 miles farther to Hailun. This road is a purely Chinese project, financed with Chinese capital, under the direction of Governor Wu of Heilungkiang Province. It is claimed that the whole line has been built with excellent trackway, permanent buildings, and big bridges, and equipped with the best of American-type rail stock, at a total cost of but $20,000 per mile. During the summer of 1927 a portion of the line was badly damaged by floods in the Hulan Valley, and traffic on the completed stretch is impeded by repairs while new construction is being held up.

The Hu-Hai line is often discussed as the first link in a projected Harbin-Hulan-Hailun-Mergen-Aigun railroad, the concession for which, under the term Pin-Hei Railroad, was once, in 1916, granted to the Russo-Asiatic Bank. Such a line would link up Blagovestchensk, Siberia's important wheat centre on the Amur River, with Harbin, and dominate an agricultural territory of more than 60,000,000 acres, suitable for cultivation. The present cultivated area is estimated at about 8,000,000 acres, with a population numbering 3,000,000 and grain exports are placed at 1,000,000 tons.

Tahushan-Tungliao Railway

Another important railway in course of construction is the extension of the existing

Tahushan-Changwu branch of the Peking-Mukden Railway from Changwu to Tungliaochen (Payantala). Its completion will bring into existence the whole southern section of the old Chinchow-Aigun project, for the construction of which an American concession was obtained in 1910 and subsequently allowed to lapse. Work on this 90-mile stretch is at present proceeding actively under the supervision of the Peking-Mukden Railway. It is expected that all earthwork will be completed in 1927 and the road opened to traffic the following year, if no untoward conditions are encountered. It traverses a country at present sparsely inhabited but admirably fitted for agricultural settlement as well as for cattle raising.

The completion of this road will provide an all-Chinese line from Angangchi, on the Chinese Eastern Railway in North Manchuria, to the potential port of Hulutao. Some opposition to its construction has been encountered, since it will parallel for a considerable distance Japan's South Manchuria Railway, and provide an all-Chinese competitive outlet for the region now covered by the Ssupingkai-Taonan Railroad and its projected extensions.

Mukden-Hailungchen Railway

A third line, opened September 3, 1927, is the Mukden-Hailungchen Railway, which is to be extended northward from Hailungchen to Kirin, about 90 miles. This extension is being constructed by the Chinese authorities of Fengtien and Kirin Provinces, and completion during 1928 is anticipated.

Opposition to the construction of the extension to Kirin is also being encountered, on the ground that it parallels both the South Manchuria and the Changchun-Kirin roads. It is feared that if the provincial authorities bring to accomplishment the passage of their line across the zone of the South Manchuria Railway at Mukden, thus linking it with the Peking-Mukden line, it, too, may become a feeder of the proposed all-Chinese railway system terminating at Hulutao. Not only would this interfere with the economic control imposed by present railway systems in Manchuria, but it would tend to face the whole Kirin productive area economically toward the south, whereas plans have been made to give this territory an outlet toward the east by a line from Kirin to the seaports of northern Chosen.

Kirin-Chosen Railway

Both Soviet Russia and the Chinese authorities at Peking, it is reported, have been informed that the Kirin-Tunghua-Kainei (*Hweining*) railway project, which has been in abeyance for 10 years, is now to be pushed through to completion by Japanese capital. This line consists of two sections : The Kirin-Tunghua, 150 miles long, which is actually under construction, and the Tunghua-Kainei section of 75 miles, which is still on paper. The whole road traverses difficult country, and even on the Kirin-Tunghua section, where the Sungari River has been successfully bridged, track already laid for about 25 miles out of Kirin, and most of the earthwork completed, the tunneling is so extensive that the line will not be opened until October 28. At Kainei, on the Chosen border, the road will meet a projection of the Chosen Railway from the ice-free port of Seishin.

In 1917 Japanese interests agreed with the Chinese to advance a loan of $10,000,000 for this project, China to build the line. Political circumstances later arose to prevent this construction, but the project is now being pushed to completion by the South Manchuria Railway, on behalf of the Chinese. The new road will parallel the eastern branch of the Russian-Chinese-owned Chinese Eastern Railway and divert to the Chosen port a large amount of North Manchurian produce now carried to Vladivostok. The Seishin-Tsuruga (western port of Japan) sea route is about 400 miles shorter than that from Dairen to Kobe, so that one effect of the construction of the new railway might be to greatly stimulate the development of Japan's west-coast seaports. Opposition to the scheme, also, it is reported, has originated among the commercial interests of Dairen, which claim to see a large economic area faced away from their port by this railroad.

Taonan-Solun Railroad

This is a projected road to extend northwest from Taonan, avoiding the heavier grades of the Khingan Mountains, to Solun, a distance of 225 miles. It is then planned to continue northeast to Hailar, a great depôt on the Chinese Eastern Railway for the collection of wool, livestock, and hides and skins from the Mongolian nomads. The total length of the line as now planned is to be 350 miles. It will tap a great expanse of fertile and virgin country and provide a suitable jumping-off line for future railway extensions into outer Mongolia. The project is planned by the Chinese provincial authorities of Manchuria, and is at present in process of resurvey by Peking-Mukden engineers.

Opposition is being encountered to the construction of this railway owing to the fact that it will constitute another drain upon the territory of the Chinese Eastern, analogous to still another line now being surveyed by Peking-Mukden engineers for the Manchurian authorities. This line is also designed to start from Taonan, run *via* Fuyu (Petuna), at the junction of the Nonni and Sungari Rivers, and thence northward to Station Anta, the market town of the heaviest grain-producing area on the Chinese Eastern Railway.

Tungliaochen-Kailu Railway

Another project in process of survey, comparatively insignificant as to length but important because it crosses the boundary of Manchuria into the disputed Jehol specially administered district, claimed by both China and Mongolia, is the 50-mile extension northwest from Tungliaochen to Kailu. It might be regarded as the first step in the construction of an interior railway system into Jehol and Chahar. Future developments, furthermore, might establish Kailu as the leading junction point for a line from Dolonor, or perhaps Kalgan, with a north-and-south feeder for Hulutao.

Other Railways Planned

Several other projected railways, some still in their infancy, are worthy of mention. Among the most important is the line from Agangchi to Tsitsihar. This is the terminal, 22-mile section of the Taonan-Angangchi Railway. Special interest attaches to it because its construction is assured only after the surmounting of difficulties connected with the right to a crossing over the Chinese Eastern Railway's main line at Angangchi. The Chinese Eastern finally yielded to representations of the Peking Government in August, 1927, and agreed to a viaduct crossing. The line is to be built by the South Manchuria Railway and should be completed in 1928.

Construction of a proposed railway from Tsitsihar to Aigun would be a materialization of the Chinchow-Aigun project of years ago. As planned, the line will extend from Tsitsihar to Aigun *via* Mergen, a distance of 270 miles. Surveys of this route were made first under the American concession rights, and, later, in accordance with the concession terms granted the Russo-Asiatic Bank in 1916. Indications are now that actual construction is about to be started, Japanese capital and direction to do the work for the Chinese.

There remains a number of other projects of more or less interest in the various Russo-Japanese-Chinese schemes of railway development, but they are as yet on paper. Some of them are unlikely to come to actual construction until questions involving other than purely economic considerations have been brought nearer to settlement. Commercial Attaché Julean Arnold states, however, that it seems likely that during the next 10 years there will be an additional four or five thousand miles of new railways constructed in Manchuria.

Tokuyama Steel Sheet Company.—The Osaka Teppan Seizo K. K. (Osaka Sheet Iron Manufacturing Company, Ltd.) is planning to organize a new company to be known as the Tokuyama Teppan K. K. The new company is to have a capital of Y.5,000,000 and will take over the Tokuyama Mill of the Osaka Teppan Seizo at Y.3,000,000 for trade marks, equipment, good will, etc., while an additional Y.1,500,000 is to be expended in new equipment which will double the present capacity of the factory.

Equipment now installed in the Tokuyama Mill includes two Primary Rolling units, four Finishing Roll units, two Cold Rolling units, for the manufacture of sheet iron from No. 16 to No. 28 gauge, average daily capacity about 20 tons. The productive capacity of the mill will be increased to double this figure. Some reports say production will be increased to 3,500 tons a month, but this figure seems rather high.

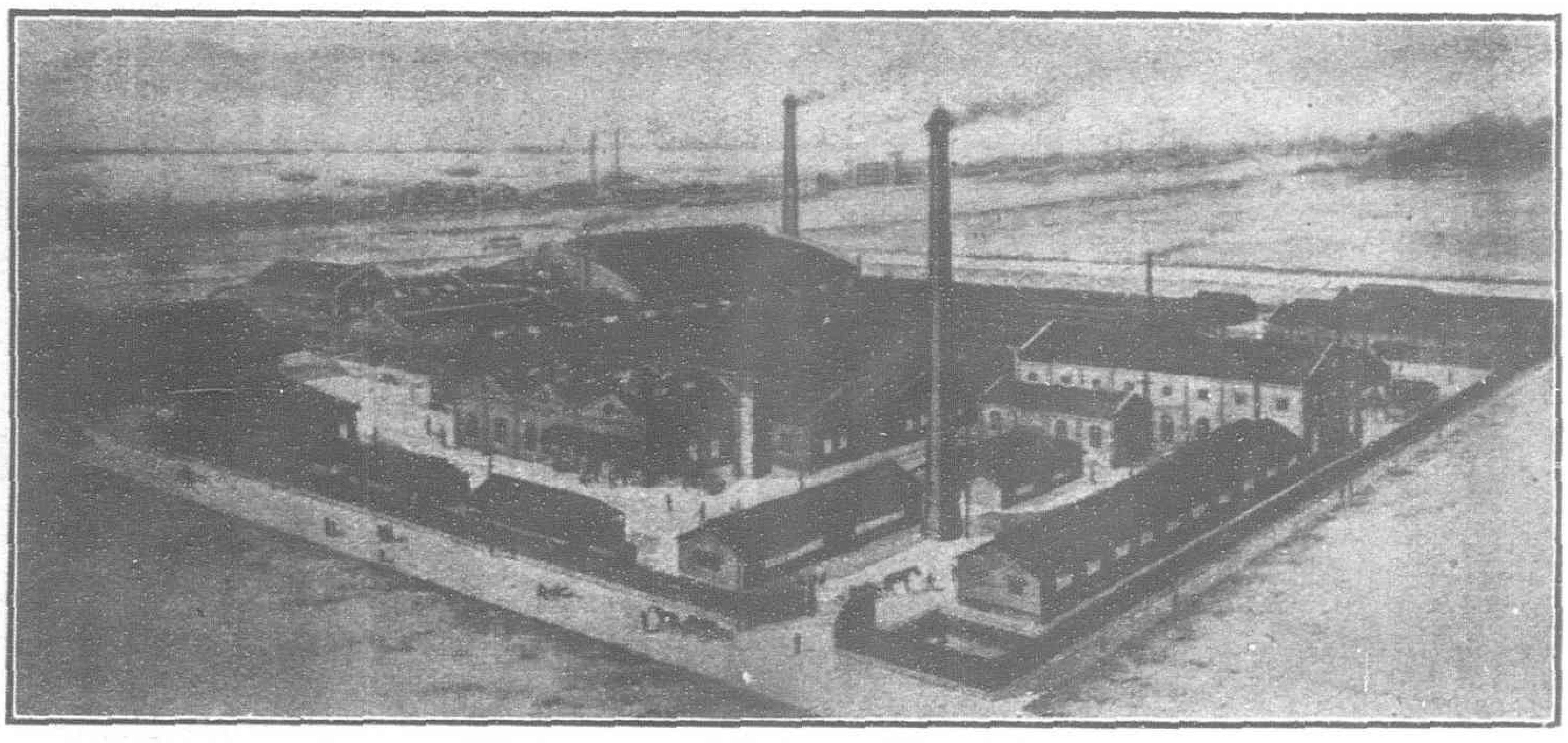
Iwai and Company, Ltd. are closely connected with the Osaka Teppan K. K. and this newly planned subsidiary.

The Furukawa Electric Industrial Co.

THE Furukawa Denki Kogyo Kabushiki Kaisha (Furukawa Electric Industrial Co., Ltd.) was established on June 25, 1896. Originally, it was known as the Yokohama Densen Seizo Kaisha (Yokohama Electric Wire Manufacturing Co.), but on April 22, 1920, it assumed the present title.

The copper refining and electric wire making of this company took origin in 1884, when the Furukawa House started a copper refining factory at Honjo, Tokyo. Later, in 1889, it was successful in electrolyzing copper, and in 1896, it commenced the making of electric copper wire.

Japan being an important copper producing country, has a long history in copper coining and copper ware making, but it is of a comparatively recent date that copper began to be worked into electric conductors. Until the company started copper electrolyzing, all the copper put out in this country and exported was sent in ingots and slabs. Even for years after that, the amount left after electrolyzing had to be exported unrefined. This condition of exportation not being the primary object of copper production, the company drew up a plan for the use of all the production domestically by the manufacture of it into various articles. It went toward the realization of the plan through all difficulties.



The Kyushu Electric Wire Works

In the meantime, the Government had started its telephone work. The demand for copper conductors was suddenly enlarged on account of this new official enterprise. This demand could be satisfied for the main part by the Furukawa company by the supply of its products.

Since then, the electric industry of Japan made steady development, which tended to increase more and more the demand for electric conductors. The company erected in 1905 a big electric power station on the Daiya River, which runs through the town of Nikko, Tochigi Prefecture, and in the year following, its Copper Works at Honjo, Tokyo, were transferred to that place, where they were greatly extended by the use of the cheap motive power. They are known at present as the Nikko Denki Seidosho (Nikko Electrolytic Copper Works).

By that time, communication works and electric light, power and railway business increased remarkably in Japan at an outcome of the postbellum industrial activity. In the Army and the Navy, too, the use of electricity was considerably extended. But no Japanese works could make as yet insulated electric wire required for these purposes, and they had to be obtained entirely from foreign countries.

The Furukawa company took the initiative in launching this enterprise by setting up a big wire factory in Yokohama. Soon it succeeded in the making of electric cables for the first time in Japan. The company later took an interest in other electric wire manufacturing companies. This accelerated its long established business policy to extend the use of domestic copper in the country as much as possible, and on the other hand it proved a way of preventing the importation of foreign products.

In July, 1925, the company received credit for its services rendered to the electric industry of Japan, being publicly commended by the Dai Nippon Industrial Association as one doing much for the development of industry and preventing importation.

It has ever been engaged actively in its industrial research work. It has engaged foreign specialists and has sent its engineers to foreign countries, in order to keep abreast of the progress of the Western electric industrial world.

Recently, it succeeded in the manufacture of guttapercha insulated submarine cables, non-induction cables and steel core aluminium twisted wires and got patents for its various inventions of electric transmission and electric railway wires, cable connectors and wiring apparatus. A short time ago, in addition, it acquired from the owning Corporation the right to use the patent for cables of the " H " type, which are extensively in use at present in Europe and America, as a result of its investigations made with a view to meeting requirements for super-high tension cables, created with the recent development of electric transmission.

Its electric wire industry produces every line of electric conducting materials for laying above and under ground and in water as well as insulating and armoring materials, with which it has been able to most satisfactorily accomplish its object of electric wire industrial independence.

In December, 1921, it bought up the Kyushu Electric Wire Manufacturing Co., Ltd. This considerably enlarged its producing capacity, which now stands in value at 50,000,000 yen a year, being enough not only to prevent the importation of the foreign products but to export its products to China, South America, India, and South Sea Islands, where they have been favorably received.

The earthquake in September, 1923, and the following conflagration destroyed the main part of its Yokohama Electric Wire Works and Honjo Copper Works. Soon, however, it set about the re-construction of these works. The Honjo works were transferred to Nikko, while a lot of ground of about 20,000 *tsubo* was obtained at Nishi-Hiranuma-machi, Yokohama, on which the present workshops of the Yokohama Electric Wire Works were erected. The new works possess a more complete equipment and a larger capacity than before the earthquake.

In 1914, the company established a storage battery factory at Amagasaki, Osaka, thinking that the progress of traffic facilities and the development of civilization in general in Japan will necessitate the growth of requirements for storage batteries. The factory now finds itself among the most important works in its line in this country. Recently, it has been extended for the manufacture of storage batteries for automobiles and radio sets, in order to meet the great increase in the demand for them, and it is now in a position to supply the market with goods of excellent quality.

The company's products, when exhibited at foreign and Japanese fairs and exhibitions, have always won Grand Medals of Honor.

The Company's capital stands at :

Total	Yen 20,000,000
Paid up	,, 12,500,000

The Company undertakes :

1. Metal refining, alloying and working and chemical industry.
2. Electric wire, rubber ware and electric machine making.
3. Selling of these products.
4. Investing of capital in similar enterprises.
5. Supplying materials for products of the companies interested by it as above and the selling of their products.
6. All necessary work accessory to the above items.

Its products include:

- Copper wires and cables.
- Electric wires and cables.
- Underground cables.
- Submarine cables.
- Sheets, bars, rods, strips, ribbons and pipes of copper, brass, bronze, yellow metal, aluminium, zinc and lead.
- Miscellaneous articles.

These products may be sub-divided as following:

Copper wires (flat and square), silicon copper wires, uncovered twisted copper wires, steel wires coated with copper, various kinds of trolley wires, aluminium wires, steel core aluminium wires, various kinds of covered electric wires, electric telegraph submarine cables, military electric wires, connection boxes, one side copper plates, lead tubes, storage batteries, copper vitriol, metallic selenium, electric transmission and trolley line apparatus, etc.

The works and business office are as follow:

Works:
- Nikko Electrolytic Copper Works
- Yokohama Electric Wire Works

Works:
- Kyushu Electric Wire Works
- Osaka Storage Battery Works

Its directors and chief officials include:

S. Nakagawa ...	President	T. Hasegawa ...	Director
M. Ogino	Mng. Dir.	Dr. M. Tonegawa	,,
Baron K. Nakajima	Director	M. Takahashi ...	,,
I. Mitani	,,	R. Hiranuma ...	Auditor
K. Yamaguchi ...	,,	K.Aoki	,,

Its yearly producing capacity and turnover are shown below:

Works	Yearly Producing Capacity
Nikko Electrolytic Copper Works	Yen 30,000,000
Yokohama Electric Wire Works	,, 30,000,000
Kyushu Electric Wire Works	,, 5,000,000
Osaka Storage Battery Works	,, 600,000
Yearly turnover of the company	,, 50,000,000

The company has as its chief customers in Japan the Communications, Army, Navy and Railway Departments, and other Government offices, electric companies, shipbuilding yards, mines, etc., while its products are exported to China, South Sea countries, India, Near Eastern countries and South America.

The Making of the Imperial Chemical Industries Limited

THE merger of such important industrial enterprises as Brunner, Mond & Co. Limited, Nobel Industries Limited, The United Alkali Company Limited, British Dyestuffs Corporation Limited, into the Imperial Chemical Industries, Ltd. is naturally a matter of international importance, for behind the activities of each of these organizations is now the united strength of all of them. Sir Alfred Mond, in discussing the present merger, states:

Mergers of such great magnitude as Imperial Chemical Industries Limited are not merely of financial or commercial interest. They have a wider national and imperial aspect. The formation of great combinations in other countries caused the leaders of the chemical industry in this country to consider the relative positions of their individual concerns and of the industry as a whole. After very careful consideration of all the relevant circumstances, they came to the conclusion that the time had arrived for the British and Imperial chemical industry to endeavor to form equally a united front.

Strong as the units of the combination were and capable as they were of operating in the future, as in the past, with profit to their shareholders and with benefit to the country, it was felt that by union still greater efficiency, both commercial and technical, could be obtained for the development of existing and creation of new chemical industries, with the great advantage of saving any unnecessary expenditure of capital by duplication and overlapping. The constituent companies operate not only in this country, but throughout the Empire and the markets of the world.

The formation of Imperial Chemical Industries Limited will enable the British chemical industry to deal with similar large groups in other countries on terms of equality. It will enable the industry to speak with a united voice. Instead of leaving it to individual units to make arrangements for the world's competitive conditions as best they can, Imperial Chemical Industries will give them all the authority, prestige and advantages of a great combination.

To-day capital expenditure on modern chemical plant runs into many millions of pounds. Specialisation of products, the most efficient use of capital and of technical processes therefore become vital factors to success, not only in the chemical industry, but throughout all modern industries.

Modern mergers when managed by able business men are not made for the purpose of creating monopolies or of inflating prices. Fusions are formed for the purpose of realising the best economic results which both capital and labor will share to the best advantage. They enable varieties of industries to form an insurance against fluctuations of markets and prices in individual products. In fact, both for the shareholder and the worker, fusion acts as a form of insurance against those risks in industry which are inherent and cannot be avoided, even by the most skilful management.

The chemical industry of Great Britain has always been one of its leading features. In past days, Great Britain has produced a body of courageous and scientific inventors in the realm of chemical industry as large as (if not larger than) any other country. This is a fact which is often too little appreciated. To-day, British technologists are competent to deal with any and all of the new and intricate problems which confront them. In many respects there never was an era when the future of the chemical industry in so many new directions showed such striking possibilities. A combination such as has been formed, having at its command capital, management and research to enable it to finance, develop and explore all new potentialities, should be in a position second to none to keep the country and the Empire in the first and foremost rank of an industry which is essential for the national safety and fundamentally the basis of a vast superstructure of other industries depending upon its products—for chemicals form the foundations of industries.

The relationship between the co-partners in the chemical industry has had a fortunate and happy history. Those who in the past have conducted the industry have always regarded all those working with them in any capacity as fellow-workers in a common cause. The foundation of Imperial Chemical Industries Limited will not alter that close personal contact which has happily existed for more than one generation between the captains and their companies of men. The goodwill of all those engaged in the industry is one of the most valuable of invisible assets, and this is fully recognised by those who will control the future destiny of the chemical industry of Britain and the Empire.

The Directors of Imperial Chemical Industries Ltd. are:—

The Rt. Hon. Sir Alfred Mond, Bart, M.P.	Chairman of the Company; Chairman Brunner, Mond & Co., Limited.
Sir Harry McGowan, K.B.E.	President and Deputy Chairman of the Company; Chairman and Managing Director of Nobel Industries Limited.
The Rt. Hon. Lord Ashfield, P.C.	Chairman of British Dyestuffs Corporation Limited.
Sir John Brunner, Bart.	Deputy Chairman of Brunner, Mond & Co., Limited.
Dr. G. C. Clayton, C.B.E., M.P.	A Director of the United Alkali Company Limited.
Mr. H. J. Mitchell	A Director, and General Manager of Nobel Industries Limited.
Mr. Henry Mond	A Director of Brunner, Mond & Co., Limited.
Sir Max Muspratt, Bart.	Chairman of the United Alkali Company Limited.
Mr. J. G. Nicholson	A Director of Brunner, Mond & Co., Limited.
Lt.-Col. G. P. Pollitt, D.S.O.	A Director of Brunner, Mond & Co., Limited.
The Most Hon. The Marquess of Reading, P.C., G.C.B., G.C.S.I., G.C.I.E., G.C.V.O.	
Mr. John Rogers, O.B.E.	A Director of Nobel Industries Limited.
Sir Josiah Stamp, G.B.E., F.B.A.	A Director of Nobel Industries Limited.
Mr. B. E. Todhunter, O.B.E.	A Director of Nobel Industries Limited.

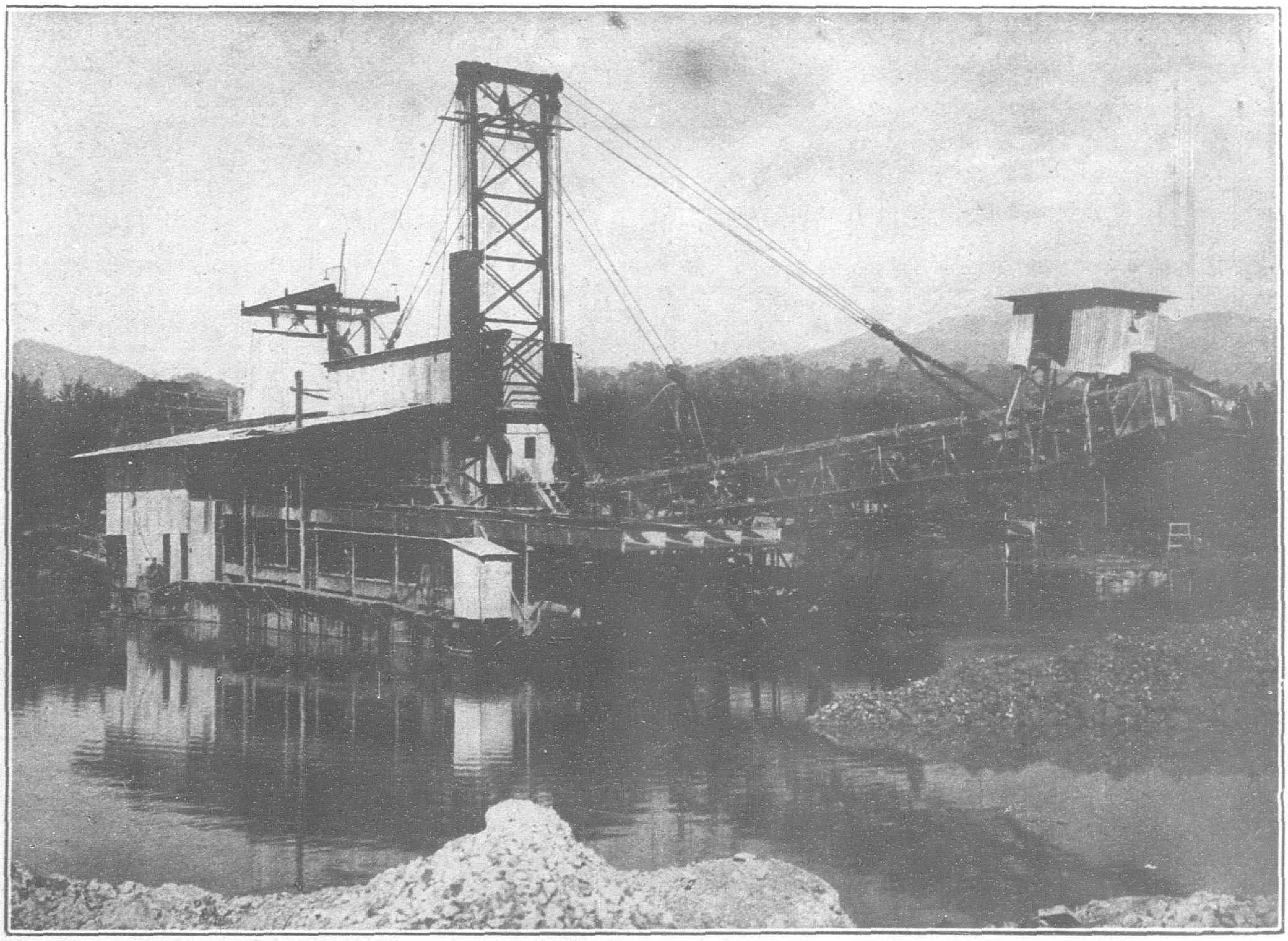
Mining in Malaya

A Century Old Industry which Leads the World

Gold, coal and tungsten ores (wolfram and scheelite) are successfully mined in Malaya, but tin preponderates. For many years the F.M.S. have been the largest producers of tin in the world ; they also have the world's largest hydraulic tin mine and one of the largest tin-lode mines—*The China Express and Telegraph.*

FROM the earliest times tin has been worked in Malaya. It is probable that the Chinese were the first to discover its uses, and records dating back nearly five hundred years tell of men being sent to the mountains of Malacca to mine it. Tin coinage was actually current in Malacca when the Portuguese conqueror, D'Albuquerque, arrived. In the last few decades the extraordinary progress of the country is intimately related to the skilled exploitation of the tin-fields and the revenues obtained therefrom by the administration. The deposits worked are for the most part alluvium, and at one time it sufficed to work them with hand labor. To-day conditions are different. The exhaustion of the richer deposits has necessitated the working of the lower-grade deposits and to this end modern machinery and labor-saving appliances are revolutionizing the industry. British, Australian, French and American capitalists have found the systematic working of these lower-grade deposits attractive, and the antique methods of the past, good enough in their day, are gradually being ousted. As an example, of the transition we find that whereas the number of coolies employed in 1902 was 174,780 and h.p. of machinery 5,000, in 1922 the coolies had decreased in number to 82,195, with the h.p. of machinery raised to 59,278. The tendency now is to mine on a large scale with cheap power, so that the mining of very poor ground will become a profitable venture, on account of the large amount of ground worked. Large open casts using cheap steam-electric power, bucket dredges capable of cutting over 100,000 cubic yards a month, and worked by steam and electricity, hydraulic mines using part of their power for cutting and part for developing electric power, suction dredges driven by the latest steam-electric machinery, are among the methods employed. These processes are all admirably described in "Mining in Malaya," by G. E. Greig, A.R.S.M., Acting Senior Warden of Mines, Federated Malay States, and issued by the Malay States Information Agency. The booklet mentioned gives geological details and technical data; it also goes very fully into such matters as transport, labor, legislation, living conditions, etc., and concludes :—

"The present tendency is to obtain large areas and work them on a large scale with cheap power. More attention is being paid to the use of electricity on dredges and elsewhere, developed both hydraulically and by steam. The bucket dredge, popular though it is on account of the low running cost per cubic yard, is not an ideal form of mining in many areas. Where the bottom is soft, as with shale, etc. the ore-bearing ground can be cleaned up very thoroughly ; but where the bottom is very eroded limestone as it is in so many places, it is impossible for the buckets to clean up all the ore, and such as remains between the pinnacles is probably lost for ever. In this respect the suction dredge is more satisfactory in that the ground lying among the limestone pinnacles can be got at and removed. As a rule, however, it is expensive to work under



Tin Dredging in the F.M.S. Bucket Dredge on the Rawang Tin Mining Properties at Rawang, Selangor

these conditions, as practically all the ground has to be laboriously dug out and carried away by hand. Proposals are on foot, however, to deal with this loss in limestone country, even when operating by bucket dredges. The gradual exhaustion of the workable areas on the flat country will lead to more attention being paid to the hills.

"It is conceivable that in the future, with tin at a sufficiently attractive figure and an abundance of cheap power, those hills which contain workable deposits of ore will be mined by water under pressure, the tin ore recovered, and the tailings sent down to the valley below, where they will be impounded. The opportunities of discovering more lode deposits will be thus greatly enhanced by the removal of the alluvium."

Coal, Gold, etc.

A deposit of coal in Selangor has been developed on sound lines. The product was invaluable during the war, when foreign coal was either unobtainable or prohibitive in price. It is comparatively young coal and occurs in two distinct beds of 40 and 25 feet thickness respectively. The proved area is about 200 acres. The coal is of fair quality and has a calorific value of about three-quarters of that of Cardiff coal. It is thus described :—"It has a pitch-black color and breaks with a conchoidal fracture. It is fairly hard, and has a specific gravity of 1.2-1.3., It does not coke and burns with a long flame." Its great characteristic however, is its tendency to spontaneous combustion, dur to exodization. The two seams are worked in two days. Originally an incline was sunk on the upper seam and the coal was worked by pillar and stall. It was found, however, that the liability to spontaneous fires was too great, and whole sections of the mine had to be bricked off in consequence. Recently a most successful method of sand filling was introduced, which enables the whole of the coal to be won by the long-wall method and eliminates all chance of fires. There is no gas in the coal.

Alluvial gold has been worked for centuries at various points in the Peninsula. Lode mining has attracted European capital, but, so far, the output has not been large. The Raub mine, in Pahang, is a low-grade proposition, and has been worked to a considerable depth. This is the only gold mine, as such, that remains of many, though it is quite conceivable that others may be re-opened when transport facilities improve, and interest has already awakened in one or two other deposits. The Raub mine has now been working for over thirty years and produces about 14,000 oz. of gold a year. The average content of the rock is between 3 and 4 dwt. to the ton. The power is obtained from a hydro-electric power-station on some falls seven and a half miles off. About 16,000 h.p. are developed. The method of mining is the usual one of shafts and levels and the ground is taken by stoping. The ore is treated in the usual mill. New plant to treat the ore by the cyanide process has lately been erected. Gold is found along a belt of country stretching from the southern boundary of Negri Sembilan through Pahang into Southern Kelantan and Lower Siam. It is also found in Upper Perak in the head waters of the Perak River mixed with tin ore in the Bidor district to a small extent.

Wolfram is usually mined as a by-product with tin ore, though in certain places it is mined for its own worth, as in Trengganu and Kedah. It is found in veins and in mass and is usually mined by open-cast methods. Scheelite, calcium tungstate, is found usually associated with limestone. Where found in quantity it is mined by open-cast methods. Monazite is disseminated all over the country, but in small quantities, and is generally associated with tin ore, from which it is separated magnetically. China clay occurs in many places and is very abundant. It of of good quality, and is being successfully exploited Limestone occurs as large isolated masses, and is in a form that can be and is worked into marble of various colors. Phosphate is found in the caves in the limestone hills.

Railways in China and Manchuria

IN their report to the Department of Overseas Trade on the present situation in China (H.M. Stationery Office, Price 1s 6d.), Messrs. H.H. Fox, C.M.G., and H. J. Brett, H.M. Commercial Attaches at Peking and Shanghai respectively, describe the present deplorable condition of the Chinese railways. Practically every Government railway of any importance in China is now completely under military control and the bulk of its greatly restricted earnings diverted to military purposes.

At the end of June, 1927, railway communication between Peking, Tientsin and Shanghai had veen interrupted for months. The same remark applies to the Peking-Hankow and the Peking-Suiyuan lines, and the Peking-Mukden line, though it has functioned fairly regularly since Marshal Chang Tso-lin assumed control of Peking, is liable to be interrupted at any moment. The Lunghai has been closed to commercial traffic for over a year—the Shanghai-Nanking and Shanghai-Hangchow-Ningpo railways maintain with difficulty restricted services and the Chinese section of the Canton-Kowloon railway, after a series of acts of sabotage by insurgent Communists, is just able to run one train a day each way. It is a common sight to see heaps of cargo piled mountain high in Chinese railway stations awaiting transport (and in the case of native produce rapidly deteriorating) while long lines of empty cars made up of rolling-stock from half a dozen different railways lie idle on the sidings in charge of a rabble of unkempt and tattered soldiers, often little more than boys, who eat, sleep and perform their perfunctory ablutions in what were once the spick and span sleeping and dining cars of China's express railway services. This is the fate that has befallen the famous Blue trains—ordered in America during the great war through a British firm and never paid for—which at one time assured a quick and comfortable service between Peking and Shanghai.

As each military commander naturally requires all the rolling-stock that he can lay his hands on — especially when carrying out one of his periodical strategic retreats—he is averse, even when no fighting is in progress and the long-suffering civil administration is doing its best to start a restricted service, to allowing any of his cars to go beyond his section, lest they should never return, so on many lines the unfortunate merchant, having paid heavily for the transport of his goods at the point of departure, finds himself obliged to unload and reload half way down the line and make fresh and equally costly arrangements for their further progress to destination.

Under these circumstances it is hardly surprising that China's railways—with the exception above-mentioned—are now practically useless for commercial transport purposes; that the lines themselves—locomotives, rolling-stock of all kinds, and even permanent way—are steadily deteriorating; and that their meagre earnings, after the payments of forced military contributions, are barely sufficient to cover the cost of very inadequate maintenance.

On the other hand, Mr. Oswald White, H.M. Consul at Dairen, reports that railways in Manchuria, under Japanese influence, are making steady progress. The Mukden-Hailung line has reached Shanchengtzu, some 30 odd miles short of its objective, and it is anticipated that the whole line will be completed in a few more months. A branch line to Hsian, where there are coal deposits, is planned. The branch line from Tahusham (Peking-Mukden Railway) to Changwu, an important garrison town, has now been completed ; an extension is planned to Tungliao (Paiyintala) on the branch line from Chenchiatun. In North Manchuria the railway which is to connect Harbin with Hailun has made considerable progress. In the Leased Territory the railway from Chinchou on the South Manchuria Railway to Pitzewo is to be completed in 1927.

On the South Manchuria Railway the returns for the last two years are as follows :—

	1926-27. Yen.	1925-26. Yen.
Gross receipts	107,920,000	97,400,000
Expenditure	40,450,000	35,040,000
Net revenue	67,470,000	62,360,000

There was an increase of yen 5,600,000 in freight receipts, which were mainly responsible for the remarkably prosperous year enjoyed by the company. To cope with the constant development of goods traffic, the southern half of the line is being levelled out, and the track and bridges strengthened to allow of longer goods trains being hauled.

Engineering Notes

At the Forthcoming Leipzig Fair.—Henry Pels proposes exhibiting, together with nine other machines, a Guillotine Shears for 10-ft. wide plates by 1-ft. thickness, while among contracts recently executed by me was one for a machine to take 10-ft. wide plates by 2-ft. thickness which, probably, constitutes a record size of electrically driven Shears.

New Cargo Boat.—Mitsubushi have booked the order for one single-screw cargo boat for the Yamamoto Kaiun Shipping Co., which will be propelled by one engine 6ST60 of 2,250 B.H.P. The auxiliary engines for this ship, consisting of three sets of 3RKH25 engines, each developing 120 B.H.P at 375 r.m.p., with 80-k.w. dynamos, will be supplied by Winterthur.

Spinning Companies Abandon Plans to Build Formosan Factories.—The Government General of Formosa has encouraged some of the larger cotton spinning companies to make an investigation in the island of the possibilities of establishing mills there. It is now reported that all have reported as being disinclined to locate any mills there, and the Dai Nihon Boseki and others have abandoned any plan to enter the territory. Lack of trained labor, distance from raw material markets and climate, are among the reasons given for the action.

The General Electric Co., Ltd.—Have just recently secured a large order from the London Under-ground Railways which is a fifth repeat order and comprises 920 Traction Motors rated at 250 H.P. Weight approximately 3 tons each, also the control equipment for 63 Motor Coaches and 107 Trailer Coaches—all of which will be manufactured at the Witton Works, Birmingham of the General Electric Co., Ltd.

This order approximates in value to half a million pounds and is the largest order ever placed in England for Electric Railway Motors.

The London Underground Railway Service is one of the most severe, if not the most severe, in the whole world, in that the Trains are of heavy weight and run to the maximum speed schedule possible.

Agreement on Water Rights Reached.—Some time ago three companies, the Tokyo Denryoku K. K., Fuji Denryoku K. K., and Shidzuoka City Electric Department, applied for water rights on the Sumata River, a branch of the Oi River. Shidzuoka City has agreed to purchase the 6,000 kw which will cover its needs from one of the other companies. Tokyo Denryoku is reported to have given up its plans on this river in favor of Fuji Denryoku, while Fuji has arranged to develop water power at this source in such a way that water available at the power stations of Tokyo Denryoku further downstream on the Oi River will not be interfered with. It is also reported that the authorities will in future confine water rights on the Sumatagawa River to Fuji Denryoku and on the Oi River to Tokyo Denryoku (that is as regards these two companies only).

More Details on Sangu Kyuko Dentetsu K.K.—One of the largest of the recently organized electric railway company is the Sargu Kyuko Dentetsu K.K. (Sangu Express Electric Railway Company, Ltd.) established on September 28, 1927, with a capital of Y.30,000,000 with shares of Y.50 face value and Y.5 paid up at the present time.

The company will construct a line running from Sakura Machi, Isoki County, Nara Prefecture to Ujiyamada City in Miye Prefecture, by way of Haibara Machi in Nara and Yubar. Machi in Miye Prefecture, with a branch line from Haibara Machi to Kambe Mura, Uda County, Nara Prefecture.

Officers of the company are : Directors : Mataichiro Kanamori, Kishu Mitani, Shincho Saito, Heize Mori, Chujiro Kagita, Naokata Kataoka, and Keita Goshima. Auditors : Ichizo Hayashi, Shotaro Kobayashi, and Inosuke Takikawa. A dividend of 5 per cent. a year will be paid during the period of construction as provided for in the Commercial Code of Japan.

Nagasaki Shipbuilding Works Busy.—It is reported that since the Mitsubishi secured the patent rights for the Garbe boiler in Japan, the Nagasaki Works of the company has been securing a very good share of orders for this class of equipment. Orders now in hand include Four units of 1,300 square meters for the Department of Railways. Two units of 180 square meters for the Kagi Dento K. K. Two units of 120 square meters for the Tokyo Kaijo Building. Two units of 630 square meters for the South Manchurian Railway. One unit of 475 square meters for the Tadakuma Mines of Sumitomo, and Three units of 200 square meters for the Japanese settlement in Tientsin.

Orders have also been placed at Nagasaki for Mitsubishi-Sulzer Diesel Engines, including installations for the cruiser Haguro of 10,000 tons, for two passenger vessels of 16,400 tons for the N.Y.K., one passenger ship of 6,250 tons for the O.S.K., two oil tankers of 13,000 tons for Mitsubishi Shoji and for one freight vessel of 9,000 tons to be equipped with diesel auxilliaries of one cylinder (this last item is not clear in the Japanese original), and other smaller orders for fishing vessels.

New Contracts for G.E.—Amongst recent contracts received by The General Electric Co., Ltd., England, are two of considerable interest.

The first being in connection with the *Electrification of Ships.* They have secured several large contracts in the past, included amongst these was the *First Electrical Propelled Ship for the British Admiralty*, naturally the details in connection with this cannot be issued for publication, but it is understood that the whole scheme was a great success. Recently the same company have been favoured with instructions by a New Zealand Shipping Co., to supply a total of over 100 Motors complete with Electric Motor Control Gear, etc., all in connection with the electrification of three large ships.

The second order of interest is a repeat order for special Railway Motors for the *London Underground Railways*, consisting of 382 Motors of 240 H.P. each, and are of a special ventilated type. The General Electric Co., during the past two and a half years have supplied a very considerable number of Electric Motors for these Railways, and this last order brings the total up-to-date to 700 machines.

A further contract has also been received for Multiple Unit Control Equipments for 63 Motor Coaches and 107 Trailer Cars, all exactly in accordance with the standard G.E.C. equipment previously supplied.

Electric Power Industry in Korea.—The total capitalization of electric light and power companies and railway companies in Korea now amounts to Y.43,115,000, of which Y.25,909,887 is paid in. The capitalization of 10 companies which have not yet begun business totals to Y.140,590,000, the total capacity to be developed amounting to 354,210 kw. Summary is as follows :

Company	*Capital* Yen.	*Power Capacity Planned* k.w.
Chryokko Suiryoku Denki K.K. (The Yalu River Hydro-Electric Co.)	10,000,000	14,000
Utsuryoto Suiryoku Denki K.K. ..	30,000	15
Kampo Denki K.K.	80,000	15
Jonan Denki K.K.	100,000	40
Taikyo Denki K.K.	30,000	18
Nangen Denki K.K.	150,000	32
Koryo Denki K.K.	100,000	45
Chosen Suiden K.K. (Hydro-Electric) (Nihon Chisso Hiryo Interest)	30,000,000	120,000
Choshinko Denryoku K.K. (Choshin River Elec. Power Co. Mitsubishi Interest)	100,000,000	220,000
Sensen Denki K.K.	100,000	45
	140,590,000	354,210

Modernization of Osaka.—Three big engineering undertakings are being planned which will greatly modernize Osaka, the commercial metropolis of Japan.

The first is to improve its harbor, the next to construct an underground and overhead tramway system for rapid transportation, and the last to construct an air port for international traffic. These ambitious undertakings will need an expenditure of Y.330,000,000 during the next ten years. The money will have to be found by the flotation of loans, either internal or external, or possibly both.

The ever-increasing road traffic has led to a careful study of traffic conditions at Osaka and also in American and European towns which has convinced the authorities that the congestion can only be dissipated by constructing a system of rapid tramways across the town, both underground and overhead. Work on this undertaking is due to begin next year and to be completed in ten years. The distance traversed by the new lines will be about thirty-four miles and they will run from east to west and north to south. The whole system will cost about Y.126,000,000.

Osaka wishes to make itself an up-to-date seaport as well as a centre of commerce, The town already has a harbor that cost Y.42,000,000 to complete. The present plan involves an improvement and enlargement costing Y.200,000,000. A new quay 440 metres long and 220 metres wide will be constructed to replace the present one. In addition eight quays will be constructed on the southern side of the port, each being 365 metres long and 155 metres wide. When all are completed Osaka will have a harbor capable of accommodating alongside eighteen vessels of from 10,000 to 15,000 tons each.

As regards air transport, the Japanese Government recently decided to establish three main air ports, at Tokio, Osaka and Fukuoka. The Osaka air port will be near the harbor, covering approximately fifty acres of open ground, part of which is now under the sea and will have to be reclaimed. Work on this undertaking, which is to be carried out by the Imperial Government—though the land is owned by the Osaka municipality—will be begun shortly and will be completed by the end of next March.

Japanese Market for Printing Machinery and Accessories.—The printing and publishing industries of Japan are of comparatively recent development, the first native newspaper not having been published until 1871. According to *Commerce Reports* (Washington, D.C.), at the end of 1923, however, there were 193 registered companies engaged in the publication of newspapers, 75 companies engaged in the publication of magazines and books, and 421 companies engaged in other printing and bookbinding. These figures do not include individual proprietorships, not organized as companies, of which there are a considerable number. Total printing and bookbinding establishments operating in Japan at the end of 1923 were reported to number 1,608, employing 48,782 persons, and having an aggregate output of about £11,000,000.

On the whole, there is a good market in Japan for imported printing machinery and accessories, and the demand is constantly increasing. The outstanding factor in the sale of such equipment, however, is price, and machinery which results in cheapening the cost of production rather than improving the quality of the printing would find the readiest sale. Methods of printing in Japan are, as a rule, somewhat antiquated, but the demand for up-to-date printing is gradually becoming more apparent, and an interest is being manifested in modern machinery.

So far as composing room equipment is concerned, typecasting machines are used extensively, and can be marketed successfully, but equipment, such as racks, stands, imposing tables, galleys and sticks are almost entirely of domestic manufacture. It is estimated that about 40 per cent. of the printing in Tokio is done on platen presses ; a few printers are equipped for printing on tin, and presses for this purpose will probably find an increasing demand with the development of the canning industry. Approximately 80 per cent. of the cylinder presses in use in Japan is of the flatbed, stop-cylinder and two-revolution types, and magazines and books are usually printed on these presses. Newspapers use rotary cylinder presses, about 70 per cent. of which are of local origin. Offset printing is steadily increasing in use, and photogelatine presses are also well known. Hand presses find the largest sale. Bookbinding in Japan is usually done by hand, and not much demand exists for foreign bookbinding machinery and printing inks.

Public Utilities Merger in Japan.—The Tokyo Electric Light Co. and the Tokyo Electric Power Co. have agreed to amalgamate under the name of the former with an approximate capitalization of Y.407,000,000.

The amalgamation, which will become effective from April 1, will constitute the greatest public utilities merger in Japan thus far.

It is understood that negotiations are now under way in America for a $50,000,000 refunding loan.—*Reuter.*

Hakodate Suiden K.K.—The Hakodate Suiden K. K. (Hakodate Hydro-Electric Co., Ltd.) supplies electric light and power to the greater part of Toshima County in the Hokkaido and operates an electric tramway in Hakodate City and at Yunokawa Onsen. Business has been very satisfactory since establishment and a dividend of 12 per cent. maintained since 1923. For the second half of last year the company paid a special dividend of 12 per cent. in addition to the usual 12 per cent. to celebrate the 20th anniversary and for the first half of this year another special dividend of 38 per cent. was paid in addition to the usual 12 per cent. by way of increasing its capital, but resulting in a considerable decrease in reserves. Summary of business results is as follows :

Term	*Average Paid in Capital*	*Profit*	*Rate of Profit*	*Dividend*
2nd half 1923	Y.5,394,000	Y.398,000	18.5%	12%
1st ,, 1924	5,394,000	525,000	19.5	12
2nd ,, ,,	5,394,000	546,000	20.2	12
1st ,, 1925	5,394,000	582,000	21.6	12
2nd ,, ,,	5,394,000	632,000	23.5	12
1st ,, 1926	6,009,000	673,000	22.4	12
2nd ,, ,,	6,566,000	722,000	22.0	12 ord 12 spec
1st ,, 1927	6,566,000	625,000	19.0	12 ord. 38 ,,

Term	*Reserves*	*Depreciation*	*Surplus*	*Total*
2nd half 1923	Y.1,078,000	Y. 75,000	Y.121,000	Y.1,274,000
1st ,, 1924	1,161,000	75,000	120,000	1,356,000
2nd ,, ,,	1,247,000	100,000	132,000	1,479,000
1st ,, 1925	1,334,000	100,000	149,000	1,583,000
2nd ,, ,,	1,430,000	100,000	198,000	1,728,000
1st ,, 1926	1,535,000	100,000	252,000	1,887,000
2nd ,, ,,	1,571,000	—	86,000	1,657,000
1st ,, 1927	504,000	—	8,000	512,000

In July, 1920, the company raised the rate of charges by 25 per cent. on electric light and 10 per cent. on power on approval of the Municipality, to be effective for two years. In July, 1922, the Municipality agreed to the continuation of increased charges, subject to revision by order of the Municipality when deemed necessary. Later the Municipality closed a provisional contract with the company for the purchase of business at Y.14,000,000, but this contract was revised to Y.12,500,000 by the Municipal Assembly in February this year, resulting in cancellation of the contract on the part of the company.

Probably by way of retaliation the Municipal authorities demanded that the company cut down the rate of charges by 25 per cent. on electric light and by 35 per cent. on power. To this the company was strongly opposed maintaining that a sudden reduction might endanger the company's position. After repeated negotiations the Municipality came down to 19 per cent. on light and 18 per cent. on power and the company went up to 10 per cent. on light and 15 per cent. on power. Final decision was reached, due to the mediation of the Hakodate Chamber of Commerce, at 13 per cent. on light and 17 per cent. on power, to be put into effect from June 16, 1927.

On account of this cut in charges the revenues of the company are expected to decrease this term. The paid-in capital for the term will increase by Y.1,734,000. The sales of light during the preceding term amounted to Y.744,000, of power to Y.260,000. The greater part of the power and about 87 per cent. of light is supplied in the City of Hakodate. The reduction of 13 per cent. on light and 17 per cent. on power will result in a decrease of Y.80,000 in light revenue and Y.40,000 in power revenue, total Y.120,000. Discounting natural increase in supply, the decrease may amount to some Y.100,000. Minus this decrease from the net profit of Y.622,000 of last term (after compensation of Y.34,000 to the City) the net profit for the term will be Y. 522,000, about 12.5 per cent. of the paid in capital of Y.8,300,000. Therefore, the dividend may be cut down to 10 per cent.

Nippon Sekiyu K.K. —New wells now being drilled by the Japan Oil Company in the Niigata and Akita fields include Well No. 28 at Wada in Niigata, now at a depth of 1,560 meters, Well No. 37 at 900 meters, and Well No. 38 at 872 meters, all of which are expected to come in before the end of the year.

Well No. 7 at Takamachi shows traces of oil at 1,518 meters, No. 3. at Yasuda shows pressure and likelihood of gushing soon at 1,582 meters.

Prospecting at Yoneyama in Niigata is also expected to succeed, as indications of natural flow have been evident since October 7. At Funayama in Akita a new well is expected to produce an initial flow of from thirty to forty koku a day at 775 meters.

The New Fish Cannery Companies and the Export Trade.—The floating fish canneries in Japan were formerly a number of independent small companies, but have recently been organized into two larger groups. One group comprises the Nippon Kosen Gyogyo K.K. (Japan Floating Cannery Co., Ltd) which is allied with the Kyodo Gyogyo interests and will later include the Nichiro Gyogyo, while the other is the Showa Kosen Gyogyo K.K. identified with the Mitsubishi interests.

The participation of Mitsubishi and Nichiro Gyogyo in this business is expected to imropve business considerably. The Nichiro Gyogyo interests are selling their product through a co-operative sales organization, while Mitsubishi sells through the Hokuyo Shokai in the domestic market and through Mitsubishi Shoji in the export trade. It is expected that these two groups will eventually get together on sales agreements to eliminate price cutting and competition along this line. The Nippon Kosen Gyogyo was formally established on November 17 with a capital of Y.3,000,000 all paid in, with the following large shareholders: Kyogo Gyogyo 28,234, Matsuda Gyogyo 12,006, Hokuho Shokai 6,674, Hokkai Kosen 6,543, and Karafuto Kogyo 6,543. The Nichiro Gyogyo will probably join later with the recently licensed floating cannery, Suzen Maru, and Toshiro Watanabe will probably follow with the Kaiko Maru. This will bring up the organization of Nippon Kosen to include seven companies and 11 vessels and compared with Showa Kosen three companies and 6 vessels. The management of Nippon Kosen is as follows: Special Managing-Director, Kenkichi Ueki. Managing-Director. Naoji Nomura. Directors: Keizo Tamura, Tosaku Watanabe, Yasutaro Kayahana. Auditors: Utaya Kamimura and Hideo Suzuki.

Sanshin Tetsudo K. K.—The Sanshin Tetsudo K. K. (Mikawa-Shinano Railway Company, Ltd.) is to be formally established at a meeting of promoters and prospective shareholders to be held on December 15. Plans of construction have already been drawn up and are as follows.

The main line of the company is to start from Miwa Mura, Kita Shidara County, Aichi Prefecture and will terminate at Kawaji Mura, Shimo Ina County, Nagano Prefecture, a distance of 43.3 miles. This line will connect with the Horaiji Railway in Aichi and the Ina Electric Railway in Nagano. Gauge will be 3 feet 6 inches and will be operated by electric power received at 1,500 volts.

The cost of construction is estimated at a total of Y.14,000,000 an average of $322,580 per mile. The construction estimate is itemized as follows: Surveys and Superintendence Y.434,000. Labor Y.3,279,000, Bridges Y.534,000, Tunnel Y.5,302,800, Rails and Roadbed Y.1,209,800, Station Construction Y.960,000, Electric Power Lines Y.437,200 and Substations Y.180,000 and other smaller items.

Estimated revenues are, Y.638,236 from passengers, Y.939,667 from freight, and Y.100,000 miscellaneous, a total of Y.1,677,903 a term. Expenditures are expected to be Y.134,000 maintenance, Y.105,000 power purchased, Y.257,000 general operating expenses, Y.280,000 interest on loans, and general expense Y.79,500, with Y.50,000 for taxes, a total of Y.906,000. The estimated profit of Y.771,903 a term, less legal reserve of Y.45,000, Directors' bonus Y.15,000, leaves enough for an estimated dividend of 7 per cent. a year on a capital of Y.10,000,000.

This railway will shorten the time over the 161.1 miles between Nagaya City and Iida over the Chuo Line of the Government Railways of 9 hours to 111.1 miles and 5 hours. The present route of 202.1 miles between Toyohashi and Iida over the Chuo Line of the Government Railways will be shortened to 76.2 miles and 4 hours, while the 178.1 miles between Toyohashi and Shimo Suwa will be only 126.2 miles over the Sanshin Tetsudo line.

Iyo Tetsudo Denki K.K.—The Kawamo (or Menkawa hydro-electric power station of the Iyo Tetsudo Denki K.K., which has been under construction for two years is reported to be nearly completed. The capacity of the station is 8,000 kw., with two penstocks of 600 feet long, 6 feet diameter.

Yahagi Suiryoku K.K.—The Yahagi Suiryoku reported a total net profit of Y.784,035.87 for the last term, and paid a dividend at the rate of 13 per cent. a year. The company was supplying a total of 21,332 lights at the end of the term, 388 more than the previous period. Passengers on the company's small electric railway line increased by 2,561 to 87,423 for the term, while freight carried increased by 137, 029 kan to 2,114, 382 kan.

Total revenues for the term of Y.1,633,047.58 was an increase of Y.142,370.53 over the last term, due largely to profit from the sale of shares of the Nanshin Denryoku K.K. Total expenditures of Y.849,011.71, including interest and depreciation, increased Y.11,964.35.

The company has hydro-electric power stations in operation with a combined capacity of 21,830 kw. and has one hydro-electric station of 1,600 kw. and one steam station of 5,000 kw. under construction. Power purchased amounts to 5,000 kw. from Daido and 145 kw. from Tono Denka K.K. The principal power customers include Toho Denryoku, Tokyo Denryoku, Aichi Denki Tetsudo, Okazaki Dento, Nisshin Boseki at Nagoya and Okazaki, Naigai Boseki, Toyoda Boshoku Kariya Mill, Toyoda Shokuki Seisakujo, and general supply of 531 h.p. to 139 motors.

Yokohama Dock Company Ltd.—More friendly relations between the Nippon Yusen Kaisha and the Yokohama Dock Company seem to be evident from the recent order of the N.Y.K. for a 16,000 ton liner to be built at this yard. The future of the Yokohama Dock was decidedly gloomy up to the end of the first half of this year but some improvement is now noticeable.

It is uncertain whether the company will be able to earn much of a profit on the 16,000 ton order as this is a rather large undertaking with which the company has no experience. It is understood that very thorough investigations were made before the contract was accepted and the price agreed upon, and in view of the close connection of the N.Y.K. with the dockyard it is probable that a more liberal allowance for profit was made than would have been the case with an independent shipyard. In addition to this order, the Yokohama Dock is negotiating with the N.Y.K. for the construction of a 12,000 ton liner, it is reported.

Vessels now under construction at the company's yards include one destroyer, one oil tanker of 7,100 tons for the Nippon Tanker Company, Ltd., and one passenger and freight vessel of 3,150 tons for the N.Y.K. The yard is also turning out bridge building material and fabricated steel for other construction to a small extent. Although the number of orders received has increased this term, there will not be much increase in profit on account of the keen competition in this industry, where orders are being accepted at prices which just enable the companies to keep their shops open. Dividend will probably be the same as last term, 3 per cent. a year.

A few years ago the Yokohama Dock built five refrigerating ships for the Kuzuhara Cold Storage Co., Ltd., but this company failed to meet the contract payments on the vessels and the dockyard was obliged to sell the vessels after acquiring them by mortgage foreclosure. Three of the ships were sold to the Nichiro Gyogyo during the second half of 1926 and the other two were also sold to the same company during the first half of 1927. In addition the profit from the sale of these ships the company received $450,000 as compensation for cancellation of naval contracts following the Washington Conference, Y.300,000 from the sale of land to Yokohama city and Y.450,000 from the sale of refrigerator equipment, a capital of Y.1,200,000 all of which was used for redeeming outstanding loans.

Outstanding loans have been cut down by a total of Y.3,500,000 but of this Y.2,400,000 was paid out of the proceeds from the sale of the refrigerator ships, the interest on which had been borne by Kuzuhara up to the time of the sale. Interest bearing loans were therefore cut by only Y.1,200,000 which represents a saving of Y.50,000 a term at 8 per cent. This is at least something, and together with better business in sight, the situation of the company is likely to improve next term, though no change is expected for the present term.